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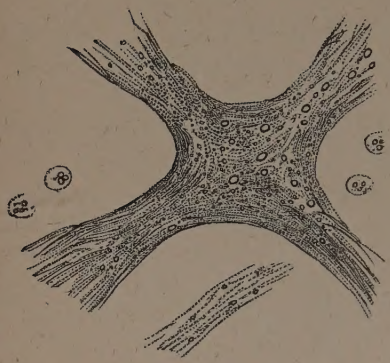

FIG. 1.—*Pulmonary tissue from emphysematous lung.*

FIG. 2.—*Bronchial mucous membrane.*

FIG. 3.—*Sputa: chronic bronchitis with dropsy.*

FIG. 4.—*Sputa: emphysema.*

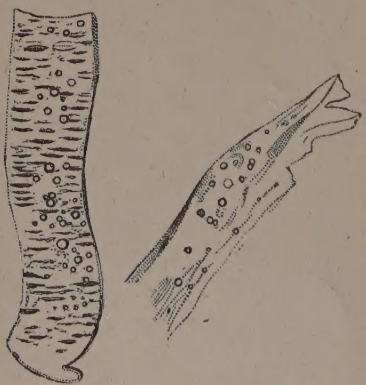

FIG. 5.—*Fatty condition of small artery.*

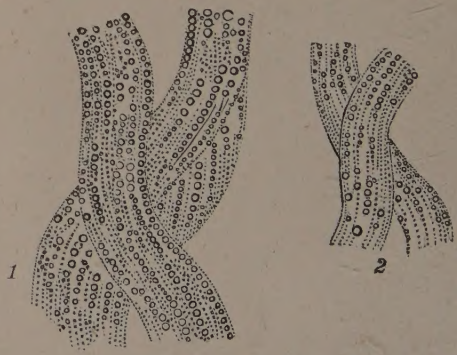

FIG. 6.—*Heart fibre.*
1. *From right ventricle.* 2. *From right auricle.*

CHRONIC BRONCHITIS

ITS FORMS AND TREATMENT

BY

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WITH NUMEROUS ILLUSTRATIONS

NEW YORK
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1882

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To the Memory

OF

MY LATE FATHER,

WHOSE TEACHING IS FELT TO BE MORE VALUABLE AS YEAR BY YEAR ROLLS ON,

This Book

IS

AFFECTIONATELY DEDICATED.

PREFACE.

THIS little work is intended for practitioners, and especially those who are commencing practice. It deals with a class of maladies which in our humid, changeable climate are very common; and which require considerable management, medicinal and dietetic—a matter scarcely dealt with sufficiently in the ordinary educational course.

The addition of numerous illustrations of diagrammatic character to illumine the text is felt desirable, as the lessons of pathology throw much light, of a practical character, upon the diseases of the air-passages. My thanks are due to the artist, Mr. Hanlon, for his execution of this part of the work. Also to Dr. H. G. Orlebar for his aid in the revision of the proof-sheets, as well as other favours.

110, PARK STREET,
GROSVENOR SQUARE, W.
February, 1882.

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CHRONIC BRONCHITIS;

ITS FORMS, AND THEIR TREATMENT.

CHAPTER I.

INTRODUCTORY.

WHO is there fairly acquainted with the practice of medicine in the country who is not familiar with the sufferer from chronic bronchitis? Brought up in Westmoreland, with its climate at once cold and humid, the writer's first professional experiences lay amidst chronic bronchitis and rheumatism; for they are closely linked together.

There was the old peasant, bent with toil and lumbago, or crippled by rheumatism in his hip, who kept the chimney-corner well in winter, and bad weather at any season; who hobbled about his garden when it was fine, supported by his stick, and generally accompanied by his grandchild; garrulous and ready to give his opinion, but interrupted sorely by bouts of coughing; his wonted remark, 'I count for little now:' yet helping to pull a few gooseberries or peas, an occupation which did not distress him by stooping; or turning out after an autumn gale to point the wind-blown apples with his stick, and watch his little grandchild gather them. Or the old dame who sat by the fireside, her favourite cat sleeping cosily at her feet, her horn spectacles on her nose, her worsted stocking in her hand and knitting-stick in belt; with her little porringer by her side to receive the phlegm. She rarely

ventured to the door, except in the fine warm afternoons of later summer, when her chair could be seen by the door full in the sunlight, in which she basked ; her cat again by her side, for they both love heat. They are a cold race, these bronchitic folk ; their oxidising processes being much impaired.

Whenever time hung heavy, and the direction in which to take a ride was undecided for lack of motive, it was usual to settle the matter by going to ask some of these old invalids how they were. My earliest professional visits were paid to some sufferers from chronic bronchitis, who perhaps felt little confidence in my skill, but who were grateful for the kindly thoughtfulness which prompted the visit, and the goodwill manifested. Or perhaps it was to some old grand-dame in a farmhouse, well attended to by her daughter-in-law and grandchildren ; got up and dressed when the morning work was over, sitting in her arm-chair with a handkerchief placed loosely over her head (for what purpose was never very clear), and her walking-stick by her side ; placid and quiet, ruminating over the past, with the air of a well-fed cow lazily chewing its cud ; caring not to be disturbed, and giving vent to a querulous wail when the occasion to be moved came about ; the wheezing râles of bronchitis quite audible, but with little expectoration. It was scarcely life ; it was but existence !

And then again, during my apprenticeship, in my later school-days, and afterwards during the autumn recess, and when in practice on a wet day, when time hung heavy, it was customary to set to work after breakfast and replenish the large bottles of cough-pills against the requirements of the coming winter. A considerable row of them there was, too : each with the constituents of the pills written in the clear legible characters of my father's handwriting, as formal and rigid as a stand of arms. There were many different kinds of pills, but the cough-pills were most conspicuous ; and the biggest bottle of all, which stood in the middle, contained a small dose of opium, with a little benzoic acid, in Pil. Scillæ Co. A very popular

pill it was, too, in the district, and the paupers had their share fairly, as well as the other bronchitic folk; for, of course, they could never sleep without their night-pill. The thrift of the people there, and the hopelessness of much improvement from other treatment, confined the medicinal regimen to these pills; except when an acute exacerbation gravely threatened life.

On other times the call was paid to some quiet country landowner, a 'laird' but scarcely a squire, who was always glad of a little change when the days got short and the usual saunter round the curtilage was impracticable. He liked to be visited in the latter part of the day, when it was possible to have the horse put up comfortably and to induce the visitor, professional or other, to join in a little spirits-and-water; the invalid enjoying the steam of the hot grog almost more than the drinking of it; coughing a little at the tobacco-smoke, but declaring it not to be the cause of the cough, and politely affirming he 'rather liked it,' in his hospitable desire to make his visitor feel at ease; and putting up good-naturedly with the inconvenience rather than forego the news, the gossip, and the chat, or 'crack,' as it is termed in the north. Where are all these old folks now? The obituary notices of almost all have appeared in the local papers; but probably another generation has grown up in their stead.

Chronic bronchitis is a malady which largely afflicts the poorer classes, and especially those exposed to the weather, often inclement, without proper clothing, and with insufficient wraps. The old dame, who now hugs the fireside and is chary about venturing into the sunshine, was once much given to outdoor labour; haytime and harvest of course saw her in the fields, so did the turnip-hoeing; while she was a regular attendant at market in all weathers, and at church, it goes without saying.

Such was the familiar scene of the past. Now the venue has changed, but the old bronchitic people are there still. In the

out-patient department of Chest Hospitals they are to be seen, a considerable proportion of the whole. With laboured respiration and tardy step they enter, puffing and panting, scant of breath, which makes speech difficult ; while a significant shake of the head often tells more eloquently than words of the inward discomfort, and that the breathing is embarrassed. Words they avoid, for the entrance of air often provokes a paroxysm of coughing, and this causes them much distress. They excite one's compassion, albeit they occupy a great deal of time to little effect ; for they are apt to be stupid and to comprehend badly, these folk. Their brains are not very bright with the imperfectly oxygenised blood circulating through them.

In the wards of the workhouse infirmary they are to be met in great quantity ; quietly keeping their beds when the other patients are up in the day-room, usually on their backs, or sitting propped up with pillows. They are a quiet people, having no breath to spare ; and if they have to talk, they take a long inspiration before commencing. The abdominal character of their respiration is seen through the bedclothes ; and the accessory muscles in the neck are conspicuous, dragging up the thorax bodily. They constitute a distinct race as compared with their neighbours in the wards. Those who are up are seen sitting with their hands upon the middle of the thigh, so fixing the shoulder as a point for the pectoral muscle to pull from. No folded arms across the chest in repose do these folk practise. If walking, they stop to talk or answer a question, and the arm is thrown on to the nearest object for the same purpose of fixing the shoulder.

Or, again, along the southern coast, as at Ventnor, or Hastings, or Torquay, sheltered from the east winds, may be seen in spring the choleric, high-complexioned old squire ; who has left, sorely against his will, his old home and his ancestral acres during the March blasts ; taking a constitutional in the sun, and finding fault with most things in this imperfect world,

and severely taxing the patience of his spouse by his somewhat acid criticisms, and remarks as acid as his own phlegm. Or the slight figure of a woman aged by suffering, respirator on mouth, clad in furs, her doubtful step and tottering gait telling of confirmed debility; a faithful attendant supporting her feeble frame. Very much like a consumptive at first sight is she; and very like one into minutiæ is she too, as her medical advisers well know. Fortunate are the victims of chronic bronchitis when, like birds of passage, they can flit south in severe weather; leaving their poorer brethren and sisters to take their chance amidst northern snows or midland gales, taking such care of themselves as their circumstances will permit.

One custom there is amongst the dwellers along the northern Pennines, the boundary of Westmoreland on its eastern border (the abrupt backbone of England), and in the dales of the Lake mountains, which I have not found to obtain anywhere else, not even on Staffordshire or Derbyshire hills; and that is—to go to bed for winter. As soon as the crest of Crossfell is whitening with the snow of coming winter, or a white nightcap covers the summit of Saddleback or Skiddaw, sundry old folks, mostly males, take to bed; like the hibernating animals. There they cosily stay, safe from the risk of cold, till the genial air of spring tempts them out once more. Like the hedgehog and the squirrel, the sunshine brings them out of their retreats into daylight and life; while the next autumn sees them in what the old Roman soldiers called 'winter quarters.' So strong is the local belief in the protective agency of such practice that it is quite common, on asking after some old invalid, to get this response: 'Oh, I think he will hold on a few years longer. He has taken to bed in winter.' Nor does the old recluse quite neglect the affairs of this world in his bed-chamber. He holds regular levees of his neighbours and workpeople from time to time, and enjoys their gossip as keenly as ever; but he keeps under the blankets

till the last east wind has blown over 'the black fells,' as the northern ridge of the Pennines is locally denominated. This is a custom which might well be followed with advantage by those who cannot flit south with the swallow, in other exposed situations, as well as on the black fell-sides, and amidst the Lake mountain valleys.

For those who possess the means, no doubt migration southwards as soon as cold weather sets in in later autumn, is the best and pleasantest plan. The southern shores of our country, or of France, or Italy, the arid regions of Algiers and Egypt, are especially adapted to the chronic bronchitic even more than the phthisical patient. A pure warm air acts like a balm on the morbid bronchial mucous membrane. But for those whose means will not permit such migration, then the chimney-corner is the best place ; and a cosy bedroom with a pleasant view from the window the fittest habitation during the winter months.

CHAPTER II.

THE OBJECTIVE AND SUBJECTIVE PHENOMENA PRODUCED BY CHRONIC BRONCHITIS.

THE symptoms complained of by the patient, and the indications manifested to the eye, are such as, *à priori*, might be expected in chronic bronchitis. The most prominent semeion is dyspnœa. The patient is scant of breath at the best of times; and therefore is distressed by any exertion. Consequently, he avoids effort. The gait is slow, and the step measured. To miss a step, or to place the foot on anything which might slip, might involve an effort which would be painful. An attitude of watchfulness is maintained which is in time so pronounced as to be noticeable. If required to talk, they deliberately stop, rest their arm on a chair if in the house, on the nearest object available if out of doors, resting the elbow to fix the shoulders, and then take a breath preparatory to speech.

Then it is well to observe the character of the respiration. It is laboured, and usually it is hurried. For this there are several reasons: (1) The lining membrane of the bronchi, and still more the bronchiæ, is swollen, and their lumen is diminished; and so the inspired air has to be drawn through smaller tubes than is the normal. (2) The bronchial tubes are either in a state of spasmodic action, or relaxed from atrophy of their muscular walls, as the case may be; and therefore present an abnormal amount of obstruction to the inspiratory

act. While (3) the thoracic space is diminished by the accumulation of mucus in the air-tubes. Further, there is also (4) the condition of the lung-tissue itself; which is commonly either the seat of interstitial growth (the cirrhotic form), or the alveoli are distended or torn into each other (vesicular emphysema), and consequently the lung-tissue has its elasticity impaired; a matter chiefly connected with expiration, but at the same time a factor in inspiration, interfering therewith and impeding the act. Consequently both inspiration and expiration are impeded, and therefore the respiratory act is laboured. The respiratory space for the residual or stationary air of the lung is diminished, and therefore to admit of this residual air being sufficiently oxygenated by the tidal air, the respiratory act is hurried. It is rendered more rapid by effort. Where the circumstances are such that the respiration cannot be hurried, then the patient has to cut his coat according to his cloth, and restrain himself from any effort which might necessitate more rapid respiration.

The proportion of the respirations to the pulse-rate is a more accurate observation, which speaks with decision. The normal ratio is as 4 to 1. If we regard the normal respiration as 18, we get a pulse-rate of 72. When this proportion is disturbed, the fact is very significant. If the pulse mount over the respirations, dilatation of the heart-walls, or mitral disease, or not uncommonly both, are present. On the other hand, when the respirations rise out of proportion to the pulse, then the lung-space is diminished by narrowing of the air-tubes, diminution of the lung-space by effusion, or morbid growth, proliferation of connective tissue, or fulness of blood (mitral dyspnœa), or accumulation of bronchial mucus.

In order to render this subject a matter of observation and not mere reasoning, I have made repeated observations upon patients with intra-thoracic disease, and found this rule to be of the greatest service. It is often possible to make the diagnosis so far as to determine whether the disease lie in the

circulatory or respiratory organs by such comparison; physical examination corroborating the diagnosis. To rely upon it to the exclusion of physical signs would be imprudent, but it is well to practise the comparison of the ratio as a 'sighting shot' of much value in giving direction to the physical examination. Then it is well to observe the patient's thorax. The eye notes that there is either the barrel-shaped chest of emphysema; or there is the flat chest so characteristic of phthisis, seen in the cirrhotic form; or the shoulders are raised and thrown forwards, as is so often the case with asthmatics; instead of the accessory muscles of respiration drawing the chest-walls out, in these cases they drag their shoulder attachments forward. Indeed, to carefully scrutinise the formation of the chest is, to a large extent, to make the diagnosis of the form of bronchitis, at least in outline. Such observation is most useful. The trained eye notes this in almost an instant of time, and the information so obtained gives further direction to the physical examination.

Then comes the countenance. From it we learn much as to the general condition. In bad cases it conveys the impression of suffering, and in doing so tells us much as to *how* ill the patient is. In comparatively slight cases this look of suffering is absent. Then, too, there are varieties of facial indications. In the thin subjects of the asthmatic, or of the cirrhotic form the face is sharp in outline, the cheek-bones are prominent from wasting of the muscles, there is pallor from anæmia—indeed, the phthisical face. In the emphysematous form the face is usually rather bloated, and the lips protrude, especially upon expiration; while the inspiratory muscles of the neck are seen in bold outline. The face may be pale or dusky in hue, according to the obstruction to the circulation. When there is a mitral lesion the face usually is injected, and the lips are blue, or even purple. Such is the typical face of mitral disease, with its blurred outlines, and often 'the mitral flush,' especially in young subjects. To carefully note all these

facial changes is very important, especially when seeing a case for the first time, as relegating it to the atrophic or to the plethoric type.

The next thing to observe is the expectoration; both the character of the act, and the appearance of the sputum. This may be scanty or copious in amount. When the first, the cough is protracted and harassing. When the amount is copious, the act is accomplished with comparatively little effort. At other times, after a period of comparative quiescence, a paroxysm of coughing comes on, accompanied by the expectoration of a quantity of mucus, not rarely of offensive character. In the first case the sputum may be like gum, or even roundish masses of viscid and semi-transparent mucus, as in the dry bronchitis of Laennec. The bronchial membrane is swollen, turgid, and irritable, and the secretion of mucus scanty. In the other case 'the phlegm is loose,' to use the popular expression; it is easily expectorated, and is frothy, or a thin, watery fluid, approaching the rheum known as bronchorrœa. It may be expectorated in great quantity at intervals. At other times the sputum is of a mucu-purulent character, or even purulent, and closely resembles that of pulmonary tuberculosis—or it may constitute a 'cast.' In most cases of free bronchial expectoration the râles are readily audible to the ear; indeed, in some cases the patient's thorax seems full of pipes, the seat of constant whistling or wheezing. Such, however, is not necessarily the case, and my colleague, Dr. Berkart, writes: 'A patient may daily expectorate several spittoonfuls of mucus, and yet the most practised and most careful observer may fail to detect, by means of percussion and auscultation the least trace of disease' ('On Asthma: Its Pathology and Treatment'). Consequently the absence of râles cannot be regarded as disproof of the existence of bronchitis in its chronic form.

As regards the sputum itself, its characters vary with the pathological condition. At the commencement of a bronchial

attack it is scanty and glutinous; then, as the secretion becomes more profuse and the mucus is churned up with the respired air, it becomes frothy. Then, as the inflammation subsides, it may become purulent, yellow or yellowish-green in colour; the popular phrase for this change is 'the cold is rotting,' a modification which is the precursor of reparation. 'In many cases, however, the disease does not run regularly and uninterruptedly through these several stages. Recrudescences, or rather relapses, are apt to occur from slight causes; and whether in the later stages of acute bronchitis, or in chronic bronchitis, these relapses are accompanied by corresponding changes in the expectoration; which will at once resume its former character, or consist partly of frothy transparent fluid, and partly of opaque greenish or yellowish-white coloured mucus. If, on the one hand, this return of the sputum to a crude form helps us to diagnose an acute relapse, so it follows, on the other hand, that the appearance of masses, or streaks of yellow or opaque sputum in the midst of the frothy sputum of a recent bronchitis, enables us to determine that the present acute bronchitis has been engrafted upon an old standing catarrh of the bronchial membrane' (Headlam Greenhow).

One matter there is about the sputum which is, when present, of the highest significance, and that is shreds or fragments of lung-tissue. These indicate that there is more than mere bronchial trouble afoot: they tell that the lung-structure is breaking down, and that ulcerating cavities are being formed. This will not necessarily involve tuberculosis of the lungs, in the strictest sense of the word, but it certainly brings the case into the category of the Phthisis Pulmonum of Cullen—'an expectoration of pus or purulent matter from the lungs, attended by a hectic fever;' for hectic fever is the common concomitant of ulceration of the pulmonary tissue.

When the patient is stripped and the chest is examined, further points disclose themselves. There is the flat chest

of the cirrhotic form, with the ribs far apart and drawn downwards on inspiration; much the same as in some cases of pulmonary phthisis. (If a female comparatively youthful, the mammæ are wasted, or ill-developed; in other words, the patient has no bust.) The skin has often a greasy unctuous look and feel. There may be depressions under the clavicle, telling of contraction at the apices; either a by-past matter, the apicial consolidation of phthisis so called, or a cirrhosis affecting the apices, in which there may lie a dilated bronchus. In the latter case, the diagnosis from lung consolidation with the formation of a cavity is impossible by the physical signs alone: and light is only procurable by a careful examination, or perhaps even cross-examination, of the patient's past history. But, as a broad rule, it is well to remember that consolidation of a chronic character, commonly spoken of as pulmonary tuberculosis, is related to the apices; while bronchial dilatation, with its accompanying thickening of lung-tissue around it, is related rather to the lower and middle lobes; and this broad rule should never be forgotten, for it may be of signal service in doubtful cases, and serves as a trustworthy guide generally. Though it may occur at the apices. Or the chest is barrel-shaped, the ribs being drawn upwards and the intercostal spaces diminished in a certain proportion of cases, with the bulging of emphysema. The depression of the intercostal spaces marks the cirrhotic; bulging the emphysematous type. The chest may bulge especially under the clavicles and over the upper portion of the chest. Indeed, there may be supra-clavicular bulging. The movement on expiration and inspiration may be very limited. In some cases the whole thorax is raised by the accessory muscles of the neck on inspiration, bodily, and falls again on expiration; with little or no action of the intercostal muscles.

In children where a considerable portion of the lung is the seat of pulmonary collapse, the respiratory act affects the

chest unequally: the portions corresponding to the collapse fail to expand on inspiration, or even may be retracted. Chronic bronchitis is rarely ever seen in children of good constitution (W. H. Day), only in the strumous or rachitic.

The veins over the chest, especially over the precordial region, may be dilated and conspicuous, when there is some disturbance in the circulation. At other times small vascular spots, like minute but brightly coloured nævi, are seen; especially where there is an atheromatous condition of the arteries.

To palpation the sighs furnished are significant. The chest may be felt to vibrate with the respiratory movements, especially where the movement of the air, alike its ingress and its outgoing, is impeded by much bronchial secretion; then the râles are felt as well as heard. At other times the costal cartilages are felt hard and unyielding. This is especially the case in elderly persons where the thoracic movements are very limited; and confined to the thorax being drawn up bodily, while the diaphragm descends on inspiration.

When the bronchi are the seat of considerable dilatation and the consolidation of the lung-tissue around is also considerable, the vocal fremitus is affected. When the tubes are blocked it is lost.

When the measuring-tape is applied it is found that the thoracic movement on inspiration and expiration is materially lessened. When one side is the sole or main seat of disease, the movement on that side is limited, while movement on the sound side is increased.

Allied in its physiological explanation to this movement of the chest walls is the phenomenon of the effect of lying down. Sometimes a patient can only lie on one side; sometimes by preference on the back. It is not necessary here to point to all the diseases of the chest which influence the respiration on lying down; but rather to point out this fact, that the movement of the side of the thorax which is undermost is limited by the weight of the trunk; while that which is uppermost is

increased, because that lung is doing the work of the respiration to a very large extent. Consequently we can see how the lung which is undermost gets physiological rest to a great extent, so long as that position is maintained. It is often then agreeable to the patient to lie on the side which is the subject of disease, and to breathe chiefly by the sound lung. Chronic bronchitic patients as a rule prefer to lie on the back, at least when awake.

Percussion tells of two matters, one of which is always fully attended to in all text-books, viz.: the character of the sound, as to its dulness or resonance; the other, very important also upon which, however, less stress is commonly laid, viz. the sense of resistance. This last often furnishes most useful information. For instance, in pleural thickening the board-like sound is not more significant than the sense of resistance, as if the finger on the thorax was in contact with a hard surface. In interstitial thickening of the lung-tissue the sense of resistance is exaggerated; while in emphysematous conditions it is lessened, as if the under finger was in contact with an elastic body. When a pleximeter is used the sense of resistance is lost; a very strong argument against its adoption instead of the sentient finger, as a rule.

In simple bronchitis the percussion note is not affected; but when there are complications, then the case is different. Dulness is produced when there is condensation of the lung-tissue. It is found with obstruction of the bronchiæ by thick mucus, and is then due to impaired inflation of the lung. It is distinguished from pleural effusion by the continuance of vocal fremitus, and from pneumonic consolidation by the absence of tubular breathing (Fuller).

When there is collapse of one or more portions of the lungs, the percussion note over such areas is dull; while it is clear and resonant over the other portions which are for the time inflated. In such cases the dulness and resonance are found to shift and even alternate in comparatively brief periods of

time. Then, when there is dilatation of the bronchi with lung-consolidation the note is altered by the depth at which the disease is seated. When deep seated a cracked-pot sound can be elicited on deep percussion. When near the surface the note is resonant, or even tympanitic.

When there is an emphysematous condition present then the sound is tympanitic and abnormally clear. It may be general, or it may be local. It is common to find emphysema of the anterior fringe, or borders of the lungs in many conditions, without there being anything like it elsewhere. Such a condition with ossified costal cartilages renders it often impossible to map out the heart, or even to make out any cardiac dulness ; and so may lead to error as to the state of the heart. There may be a large strong heart, evidenced by the sounds on auscultation and by the character of the radial pulse ; when percussion has nothing but a negative answer to give, it is dumb indeed. Another matter is the diminished area of liver-dulness in emphysema. The abolition more or less complete of the areas of cardiac and hepatic dulness is the essential characteristic of emphysema. At other times the local emphysema may be at the back only, and even on one side. Careful percussion, then, tells much about the complications of chronic bronchitis ; even when it has nothing to say about the malady itself.

Auscultation, however, is eloquent, even loquacious, about the disease. Râles are heard over the affected area, or areas, or over the whole chest. They may be so loud as to be audible at some distance, or only be heard on careful auscultation, according to the nature of the case. Usually bronchial fremitus is well heard. The bubbling of the air through the bronchial fluid produces a well-known and characteristic sound. The accompanying wood-cut tells the how and why of these sounds. Harsh respiratory sounds may also be heard, obscured by the râles. When the large tubes are affected the sounds are loud ; when the smaller bronchia are

involved they are finer and resemble crepitation. They may be heard only during inspiration, or expiration, or both. Sometimes, especially when the patient is asleep, there may be quite a musical note developed from some stringy piece of mucus. It usually disappears with a cough dislodging the causal mucus on the patient awakening. The bronchial tubes are dilated, or contracted, may be thickened, and contain a

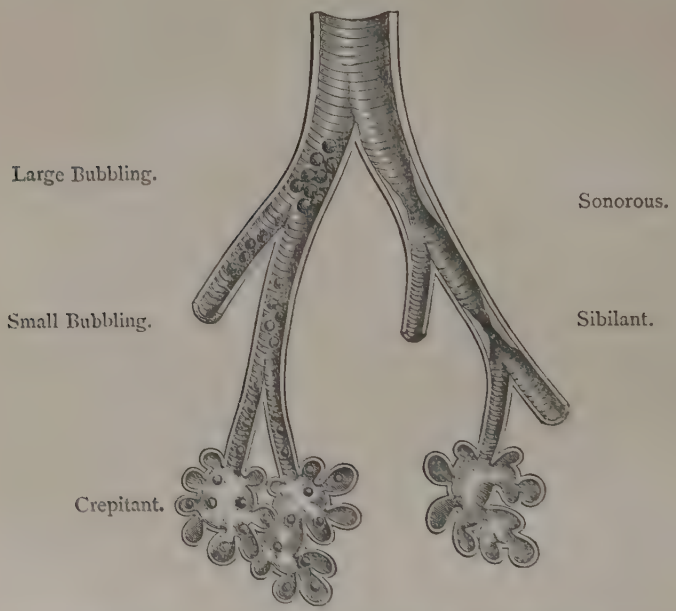


Diagram illustrative of Râles.—The narrowing in one division of the tube gives rise to dry, the fluid in the other to moist râles. The râles at the termination of the tubes and in the air-vesicles are the crepitant or vesicular râles. (Da Costa.)

quantity of mucus; and consequently various modifications of the respiratory sounds are produced. The breathing may be harsh or tubular, according to the size of the tube and the amount of condensed lung-tissue over or around it. The râles may be loud and removed by cough; or the breath-sounds may be obscure or deficient until free expectoration

clears out the accumulated mucus, when they are heard coarse and loud. When there are one, or more patches of pulmonary collapse the respiratory sounds are absent over the affected areas. When there coexists bronchial dilatation the sound is modified; being blowing or harsh where there is much secretion, and clear or ringing where the lining membrane is dry. Where the dilatation resembles a cavity the sound is cavernous.

Modifications of the voice-sound are also found. Bronchophony marks dilatation, while the vocal resonance is impaired when the lung-tissue is dense.

Broadly speaking, bronchitis produces much noise, which often prevents the heart-sounds being heard, or masks a murmur. The breath is held only with difficulty, and so it is not easy always to make out the heart-sounds as clearly as is desirable. Cardiac murmurs are consequently often overlooked in cases of chronic bronchitis; but if sufficient care is exercised they can usually be detected when present. This leads up to a very important matter, viz., the condition of the right side of the heart.

When the bronchial trouble leads to much obstruction to the flow of blood in the pulmonic circulation, the right heart is embarrassed and becomes enlarged. Such enlargement is all but invariably dilatation, with or without hypertrophy; pure hypertrophy being very rarely found. This enlargement of the right side of the heart increases the area of cardiac dulness to the right, and the cardiac impulse is felt from the second to the fifth costal interspace. The pulmonary valve-sound is loud and accentuated: telling of the increase of tension in the pulmonary artery, and the consequent forcible closure of the valves. The heart-sounds are loud and out of proportion to the radial pulse very often. The veins of the neck are full, and jugular pulsation is common, from regurgitation through the imperfectly closed tricuspid valve.

Such, then, are the indications of enlargement of the right

heart. But frequently most of these indications are absent. The costal cartilages may possibly be ossified, while beneath them lies an emphysematous lung-border. The consequence of this combination is that to palpation and percussion, and of course inspection, nothing is vouchsafed to us as to the condition of the heart. The hard costal cartilages with the elastic lung underneath prevent most effectually the heart's impulse being felt. The emphysematous lung prevents the cardiac enlargement revealing itself; and mistakes certainly do occur under these circumstances. The heart is supposed to be atrophied or fatty. In 'The Heart and its Diseases,' p. 251 of the second edition, a case is related where such a condition did lead to serious error as to the condition of the heart. Consequently auscultation is our chief means of ascertaining the condition of the heart. We can hear the heart beating away steadily in most cases by listening at the right apex. There is, too, the pulse to guide us. When there is a strong left ventricle, a very common condition where the bronchitis is of the gouty form, the pulse is that of the gouty heart, hard, incompressible, and slow. There is high arterial tension with some hardness in the arterial wall from atheromatous change. But in the other forms of chronic bronchitis this is not the condition of either the left ventricle or the radial pulse. The small amount of blood passing over to the left heart in pulmonary obstruction produces definite consequences. The ventricle, having little blood to pass on, is commonly small; the arterial system is imperfectly filled, and the radial pulse is small and compressible. Such then is the state of affairs very commonly in chronic bronchitis, whether there be mitral disease present or not. There is a distinct disproportion betwixt the heart-sounds and the radial pulse, This is common to all cases where disease of the respiratory organs impedes the blood-flow in the pulmonic circulation. Walsh, in writing on Emphysema, says: 'The pulse often strikes the observer by its weakness, as compared with the

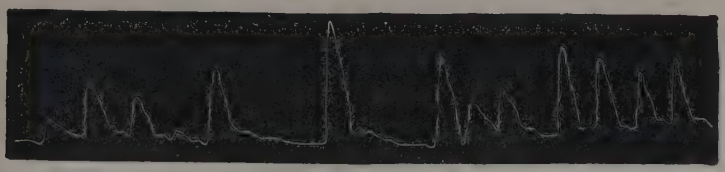
amount of cardiac impulse. This want of accordance comes of the frequency with which the right heart undergoes enlargement (while the left does not suffer), as a consequence of the pulmonary disease.'

This is a clear statement as to the actual condition of matters by this accomplished observer. But the observation is pregnant with suggestions which seem to have escaped him. The right ventricle enlarges in proportion to the demand upon it; while the demand upon the left ventricle is less than normal, so it diminishes in bulk. But to use the word 'suffer' is to create a false impression, for if it applies to either ventricle it is certainly the left ventricle which does 'suffer' in these cases. The right heart is enlarged, but there goes with it a small left ventricle; and with that again, a weak compressible radial pulse. Now, at the risk of being somewhat tedious, I wish the reader to grasp the association intelligently, so as to comprehend the why and wherefore of it. Had Walsh's power of reasoning upon his observations been equal to his marvellous power of observation, he would have been one of the grandest teachers in the history of medicine. But to observe facts without carefully reasoning upon them, is a comparatively sterile form of talent: instead of the wide grasp of the trained thinker, it reduces the intellectual powers till the observer is little more than 'the sense-machine which registers observations.' Very frequently the small pulse, compared to the vigour of the cardiac stroke, is the most suggestive matter as regards the treatment of the patient. It tells, in no faltering accents, of the tax upon the right side of the heart, and of the necessity for adding some digitalis to the cough-mixture. More especially is it necessary to lay stress upon the proportion, or perhaps rather the want of it, betwixt the heart's sounds and the radial pulse; because the rigid costal cartilages with the elastic buffer behind—the emphysematous lung-border, prevent the cardiac impulse from being felt. The resonant emphysematous lung renders any

attempt to estimate the condition of the heart, and especially the right ventricle, by percussion futile and barren of result. We are reduced then to auscultation as the only means of examining the heart; and in order to realise the condition of the right ventricle we must correct our observation by noting carefully the condition of the radial pulse. When we hear the heart beating away vigorously while the radial pulse is feeble, small, and compressible, we know there is a large strong right ventricle; whether a mitral lesion coexist or not.

Further, failure of the right ventricle is a common cause of death in disease of the respiratory organs, especially in acute exacerbations; as when the sufferer from chronic bronchitis catches cold and becomes the subject of an acute attack. The right ventricle becomes still further embarrassed; it falters, it staggers, the intermissions telling of its waning power. The intermission is felt in the radial pulse, and is the herald of coming change; very frequently indeed is the change thus announced. Every experienced practitioner knows how ominous is the halt in the radial pulse in disease of the respiratory organs. But if the ear be applied over the heart, it will be heard struggling hard, perhaps even palpitating in its efforts; but every now and again the ventricle misses its stroke. It is like a wearied wayfarer; he makes vigorous efforts, yet fails to make a steady step; he staggers and slips frequently, in spite of his putting forth all his strength. Why? Because that strength is little; he is almost exhausted. So it is with the right ventricle. It fights on, striving to drive the blood through the obstructed pulmonary vessels; but it is becoming exhausted, and little blood passes over to the left heart. Sometimes the volume of blood passed into the artery is too small for the tide-wave to reach the radial pulse. An intermission is felt in the radial pulse often when the ventricular stroke is distinctly heard. When this is the case the struggle cannot long be continued, and the right heart will come to a standstill unless the most energetic

measures are adopted—too often, indeed, even then. The accompanying sphygmographic tracing represents this intermittent pulse of right-side failure in the final changes which precede dissolution.



Then there are the subjective sensations of the patient—the shortness of breath, the cough, harassing in the day, more troublesome still at night, disturbing the sleep, often rendering it broken. There is oppression on the chest, an 'air-hunger' very trying, yet rarely actual pain, unless after a fit of coughing. Flatulence is commonly complained of, and causes much discomfort, often actual distress. The diaphragm is pushed up, the already diminished thoracic space (p. 16) is further decreased; the right ventricle is pressed upon by the elastic gas and embarrassed thereby; and the patient's condition rendered worse all round. The cough often leads to vomiting, which weakens the patient very much. In the cirrhotic cases there is commonly heavy night-sweats, which exhaust the patient. Even without these two last complications, the condition is often one of great suffering, especially when any effort is necessitated.

Beyond what may be noted by the eye, or discovered by physical examination of the chest, or complained of by the patient, there are certain symptoms produced by chronic bronchitis which are well worth bearing in mind. These are the subjective phenomena other than those which belong to the thoracic impairment given above; and which are mainly linked with the obstruction to the pulmonic circulation. Indeed, they are the consequences of *rückwirkung*, or back-

working, from the dilated right heart, plus the effects of impaired respiration. In valvular disease of the heart, when the disease involves the mitral valves the right heart becomes enlarged ; and with that there is venous fulness, often aggravated by regurgitation through the tricuspid valve. When disease of the respiratory organs leads to embarrassment in the pulmonary circulation, and enlargement of the right side of the heart, the same consequential phenomena are set up. There is a damming of blood in the venæ cavæ, and this works backward in both the veins.

The obstruction in the superior vena cava produces those facial changes referred to before—the congested look, the blue lips, the twig-like capillaries, the coarse nostrils, the blurred outline. These are due to the fulness of the veins of the face. There is also congestion of the encephalic veins. The arterial blood flows sluggishly, being imperfectly oxygenised, as well as abnormally charged with carbonic acid gas from the impaired respiratory changes ; while there is distinct venous engorgement. Consequently the mental processes are impaired, are slow or defective, and the mind is clouded, yet irritable. There is often depression of spirits, irritability of temper, suspiciousness or panphobia, with a consciousness of impaired power ; which, combined, distress the patient very much indeed. They often seem stupid, as described in the bearing of the hospital out-patient in the introductory chapter, and are painfully aware of their inability to apprehend and comprehend—of their maimed intellectual condition, in fact. There are irritability, general apprehensiveness, the sense of feeling ill, and depression ; the phenomena which tell of an ill-fed brain. Their dreams are disturbed, unpleasant, and of the nature of nightmare ; so that they often go to bed with apprehensions of evil, and in the morning feel the effects of bad dreams, which overhang their day-thoughts like a black cloud —those waking thoughts themselves being far from exhilarating or joyous.

The obstruction to the flow in the lower vena cava leads first to engorgement of the portal circulation, and later on to fulness in the veins of the lower limbs, and ultimately to dropsy. Dropsy is also produced by the obstruction to the venous circulation in cases of phthisis where the lungs are extensively diseased. The portal vein feels the dam in the venous circulation first; because it contains no valves in its course, and its vessels are very distensible. The renal veins also readily admit of the effects being felt in them also, for a like reason. Consequently we find that the liver and kidneys are functionally embarrassed. The liver is crippled and cannot carry on the further elaboration of the albuminoids which pass from the alimentary canal into the portal veins; and the result is the formation of either bile-acids or urine solids in excess. The bile-acids contain nitrogen, and are of albuminoid descent and origin; as also are urea and uric acid. The embarrassment of the liver is manifested, then, either in the formation of bile in excess, or the production of lithates in obvious quantities. These conditions require their appropriate management and dietary, which will be explained in their proper place.

The fulness of the renal veins may lead, and usually does in time, to the appearance of albumen in the urine. Passing conditions of albuminuria are now known to occur from embarrassment of the liver. The albumen which passes from the alimentary canal into the portal vein, not being elaborated by the liver, remains in the soluble form in which it enters the blood, and consequently finds its way out of the kidneys. Such albuminuria is of comparatively slight prognostic import: it may be described briefly as the albuminuria of liver-inefficiency. Its duration differentiates it from the more permanent and enduring form of albuminuria which tells ominously of engorgement of the renal veins.

This embarrassment of the liver and interference with its functional activity often becomes a matter of the highest

practical importance in the treatment; medicinal or dietetic. It is always well to examine the liver in all cases of any standing in order to ascertain its precise condition, as a guide to the therapeutic measures to be employed. The stools may be dark and offensive where there is an excess of bile; or may be pale-coloured with an excess of lithates, according as cholæmia, or lithiasis (otherwise lithæmia) is present. In either case the treatment must be directed to the morbid state; as ancillary to the main treatment of the bronchitis itself.

The venous engorgement extends to the gastric plexuses, and the mucous lining of the stomach. Consequently there exists dyspepsia with gastric catarrh, a watery gastric juice of little potency, a sense of fulness even when the stomach is empty; and flatulency often very annoying, alike to the patients and those around them. A like catarrhal condition may involve the bowels and set up and maintain some diarrhœa; but more commonly the bowels are sluggish. The venous fulness involves the hæmorrhoidal vessels, and piles are common. Bleeding from hæmorrhoids often gives much relief; and pulmonary engorgement with resultant respiratory embarrassment is commonly enough relieved by bleeding from the bowels. Indeed, many sufferers with chronic bronchitis know this so well, that they hail bleeding from the bowels with delight; because they have learned from experience the relief it brings with it. For such a condition of constipation and piles warm purgatives containing carminatives are indicated.

The genito-urinary organs participate in this venous engorgement, and prostatic enlargement is very common with old men the subject of bronchial trouble. Vesical catarrh may be found with both sexes. With women a most distressing condition is often produced. The repeated cough overcomes the resistance of the vesical sphincter, and each act of coughing forces out a portion of the contents of the bladder. This keeps the vulva constantly bathed with urine possessing irritant quali-

ties, and produces great local discomfort, of the most intractable character, from its nature. The uterine veins are implicated in the general venous fulness, and profuse menstrual losses are frequent, with leucorrhœa during the intervals, also intractable ; especially when the veins of the interior of the uterus become dilated or varicose. One other symptom there is about the reproductive organs of women which it is well to bear in mind in connection with bronchitis, and it is this—a gouty tendency commonly produces much dysmenorrhœa as the menopause is approached. In fact such gouty dysmenorrhœa is often the first manifestation of gout. Bronchitis is also a frequent result of gout. The two, then, not rarely stand in a very suggestive relationship.

In man an enlarged prostate, with or without vesical irritability, is common with chronic bronchitis, especially of the gouty type ; with or without emphysema. Consequently their coexistence is often significant as to the precise nature of the case. Such are some of the associations of chronic bronchitis which are the result of venous engorgement taking its origin in the obstruction to the blood-flow in the pulmonic circulation.

There is one matter, however, which is related to those cases of chronic bronchitis where the emphysema is marked, and it is the lowered position of the liver. In such conditions the diaphragm acts powerfully in the inspiratory act, when the sterno-cleido-mastoid muscles drag the thorax bodily upward, and in doing so depresses the liver ; while the voluminous emphysematous lungs prevent its reascent on expiration. In time the liver is permanently located lower down than its normal place. Normally the liver lies very cosily covered by the diaphragm, the lungs, and the chest-walls—the cosiest nook in the body, in fact. When so depressed, especially if also at the same time actually increased in bulk, a large portion of the viscus is merely covered by the comparatively thin abdominal parietes, and so is exposed to cold. Consequently emphysematous bronchitics are liable to have their livers upset

by what are known as 'bilious chills.' All the more that they are a reptilian, cold-blooded race from their respiratory changes being impaired. In such cases, then, the crippled condition of the liver ought to be attended to in the dietetic regimen, as well as the medicinal management of the case. Such liver is unequal to meet demands upon it. It is also well to keep the displaced liver well covered with flannel; and, where practicable, a seal-skin waistcoat over that.

CHAPTER III.

THE PATHOLOGICAL RELATIONS OF CHRONIC BRONCHITIS.

THE actual changes in the bronchial tubes themselves are comparatively unimportant, contrasted with the changes in the lung-tissue found therewith. There may be contraction at points: more commonly there is dilatation. According to Fuller, dilatation of the bronchiæ is commonly found after an attack of bronchitis of acute character; and usually passes away in time. Such dilatation is more especially found in young subjects of bronchitis. When the attack is mild, the tubes recover their normal calibre as the symptoms of inflammation pass away; but when the attack is severe and prolonged, the dilated condition remains permanently afterwards; mostly in the tubes of the third or fourth divisions, and in the lower portions of the lung. When bronchitis has become confirmed the following changes are found: 'The mucous lining of the bronchi is swollen and congested, and of a deep venous red colour, either generally or partially, in streaks or in patches. The more asthenic the form of disease, the more livid or darker coloured the membrane. Its surface is uneven and often abraded, and its substance thickened; the longitudinal and circular muscular fibres of the bronchi are much developed, and the walls of the air-passages generally are hard and thickened. The bronchi are clogged with secretion, more or less viscid, varying from a semi-opaque,

ropy, sero-mucous fluid to thick tenacious mucus, or to true pus. The more viscid and tenacious the secretion, the more pertinaciously does it adhere to the sides' (Fuller). This must be understood to apply to true uncomplicated bronchitis; when dilatation of the bronchial tubes exists, then the condition of the mucous lining and the bronchial walls is, as we shall see, different to what is described here.

According to Roberts, the changes in acute bronchitis are as follows: 'The inflammatory products are most abundant towards the bases, and in the dependent parts of the lungs; by their accumulations in the air-cells and minute bronchi they sometimes give rise to yellow spots near the surface, especially in children. Both lungs are usually affected, but to an unequal degree.' This I quote to show that, alike in its acute and chronic forms, bronchitis is rather a disease of the lower portions of the lungs than of the apices; while phthisis is notoriously associated with the apices. The mischief extends from the bifurcation of the bronchi to the fourth and fifth divisions. Then he proceeds: 'When this complaint has been long established it leads to considerable changes in the bronchial tubes. Their lining membrane becomes dark-coloured, often of a venous hue, or here and there greyish or brownish; and the capillaries are visibly enlarged and varicose. Thickening of tissues, increased firmness amounting in some instances to marked induration, and contraction of the tubes are observed, with loss of elasticity and muscular hypertrophy. The cartilages may ultimately calcify. The small tubes are narrowed or closed up: the larger being often dilated, and gaping on section. The surface of the mucous lining is uneven, frequently presenting extensive epithelial abrasions, or occasionally follicular ulcers. In some cases there is only a little tenacious mucus in the tubes; but usually they contain abundant muco-purulent or purulent matter, or frothy mucus.' This is brief but concise.

In discussing the subject Rokitanski regards chiefly bronchi-

ectasis, or dilatation of the bronchiæ. Beyond that produced by the wasting of the lung-tissue in senile marasmus, there are, he holds, two ordinary forms : the first, 'A bronchial tube uniformly dilated through a certain extent ; that is to say, the dilatation has taken place uniformly at all points of the periphery, so that a tube, which in the normal state will admit only of a fine probe, will now admit of the passage of a crow, or goose quill, or even of a larger body. The dilatation is very striking and distinct when we see a bronchial tube far exceeding in size the stem from which it is given off. It is seldom confined to a single tube, but, as a rule, affects a distinct portion of the bronchial tree ; and its branches or twigs may either undergo an augmentation proportional to their relative natural sizes, or, as is more frequently the case, the dilatation becomes more considerable the deeper and further we proceed. The second form is the saccular dilatation. Here we find a bronchial tube dilated into a fusiform or roundish sac ; the dilatation in the latter case very frequently preponderating in such a direction, that the greater space of the bronchial sac lies altogether out of the axis of the tube entering or leaving it. These sacs in rare cases attain the size of a hen's egg, but most commonly they are the size of a bean, hazel-nut, or walnut. We find also that either one or several bronchial tubes may undergo this saccular dilatation, while on both sides of the sac the normal calibre is maintained ; or the whole bronchial ramification may be affected. In the latter case numerous similar sacs of various sizes are so arranged that, collectively, they form a larger ramifying sinuous cavity, whose individual excavations are bounded and separated from one another by ridge-like or valvular duplicatures, projecting inwards from the bronchial walls.'

From this we can see how large a quantity of mucus may be accumulated in the chest without obvious evidence of its presence. Such accumulation diminishes the thoracic space to a very great extent. While the dilated bronchiæ occupy

also much of this space. The shortness of breath is then readily intelligible in chronic bronchitis.

He continues: 'Bronchial dilatation occurs for the most part, and as a general rule is most frequent and at the same time most extensive, in those of the third or fourth order.

'The bronchi near the surface and borders of the lungs are most liable to this affection, and this fact may be regarded as one of the evidences (and there are others) of the affinity between this affection and true vesicular emphysema of the

lungs. The upper lobes are the most common seat of bronchial dilatations.'

I desire the reader to make a note of this last observation. Bronchial dilatation in the apices surrounded by thickened lung-tissue cannot (probably), in most instances, be discriminated from a tubercular lung with a cavity, by the physical signs. The past history alone can throw much light on the subject.

As to the bronchi themselves, the mucous membrane and

fibrous sheath may be hypertrophied and thickened. 'The former appears in a state of chronic catarrh, being tumid, of a more or less dark-red tint, of a loose spongy appearance, and permitting of being easily torn. The bronchi are rigid; on making a section of the lung they appear like wide gaping tubes, from which a thick, yellow, purulent mucus is seen to flow, and their white, thick, fibrous sheaths strongly contrast with the inner layer of tumid and reddened mucous membrane. Such is the usual character of the first form of bronchial dilatation.

In the saccular form of dilatation the walls are relaxed and attenuated. The mucous membrane of the bronchial sacs is only slightly, if at all, reddened; it is commonly pale; the firmness of its tissue is very little or not at all modified: and it generally presents a smooth and polished appearance, similar to that of a serous membrane. The sacs contain a thin, pale-yellow, puriform fluid, or an almost colourless vitreous mucus. Rokitanski, as a pathologist, proceeds to say: 'From the very striking and almost constant differences presented by the bronchial walls in these two forms of dilatation, we are led to infer that there are corresponding differences in their nature and their causes, and we shall presently have an opportunity of pointing out in what these differences actually consist.' He then proceeds to discuss the relations of bronchial dilatation to interstitial pneumonia.

To a clinical physician the signs and symptoms, the concomitant general states of these different conditions are even more interesting; and the recent acquisition of beds at my hospital affords me the opportunity, and inspires me with the hope, that in a later edition of this work some attempt to describe the clinical relations of the two pathological conditions will be rendered feasible. I think already it is possible to differentiate clearly enough the chronic bronchitis of lung-cirrhosis from the chronic bronchitis of the opposite condition, vesicular emphysema.

Rokitanski regards bronchitis as the most frequent primary cause of both the 'uniformly dilated' and the 'saccular' form. With this distinction—the first form is found in that part of the bronchial tree in which the blennorrhœa actually exists, the tubes of the third and fourth order; the second lies beyond the seat of the catarrh, 'and depends on their obstruction by the accumulation of secretion, on the tumid state of their mucous membrane, and finally on their actual obliteration.' Occasionally the sac becomes separated from its attachments and becomes a perfectly closed cavity in which mucus collects; this may become inspissated until nothing is left 'but a fibrous capsule enclosing either a soft, fatty, calcareous mass, or a solid concretion of bone earth.'

He concludes: 'In consequence of the obliteration of a large extent of lung produced by extensive bronchial dilatation, we find that this affection gives rise to a development of the right side of the heart in the form of active dilatation, stasis, and dilatation of the more permeable portions of the lungs, which not unfrequently leads to bronchial and pulmonary hæmorrhage (Hæmoptoic Infarctus). If the bronchial dilatation be very highly developed, it induces collapse, emaciation, a cachectic appearance, dropsy, and finally total exhaustion.

'In consequence of the venosity and cyanosis to which it gives rise, it affords a very striking immunity, not only from pulmonary tubercles, but from tuberculosis in general. The fact that bronchial dilatation exerts an excluding influence on pulmonary tuberculosis has been known since the time of Laennec; and although the reasons for this influence are not understood, it has served in recent times as the basis of several plans for the cure of pulmonary consumption.'

I make this quotation, not so much for the sake of the last observation which has attracted much attention, as for the antagonism between bronchial dilatation and pulmonary phthisis; as did also Rokitanski's view of the antagonism of

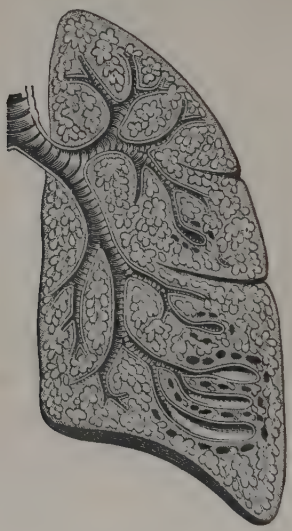
mitral disease to pulmonary phthisis—which has also been the subject of much thought—or of the attempts at cure founded thereupon, of which only the echo remains : but rather for the practical value of the preceding remark, in pointing out the lines upon which our treatment should be conducted in the view of these resultant sequelæ, in order to be successful in affording relief to our patients. The careful study of Rokitanski's accurate account of pathological conditions in my later student days, giving me an acquaintance with morbid changes far beyond what was usual in student days, at that time at least, has been of signal service to me when devising plans of therapeutic measures to be adopted ; which I firmly believe have been of the greatest service to patients. Indeed, the thoughtful consideration of pathological changes is of the utmost value in clinical medicine, when combined with an intelligent acquaintance with the action of remedial agents ; not merely the grave inspection of the ruin wrought, and the final changes seen in the dead-house, but the consideration of the early commencing changes read by the light which pathological study has thrown upon their causation.

Wilks and Moxon follow Rokitanski's divisions regarding 'uniform dilatation' as a primary affection 'usually associated with a collapsed condition of the adjacent lung-tissue ; while the latter (saccular dilatation) is connected with a structural change in the parenchyma, and is mostly a secondary process.'

The first form they hold connected with a primary bronchitis which leads to an atrophied state of the pulmonary tissue. As such it may arise from hooping-cough when leading to bronchitis and 'asthma'—as the populace term all cases of shortness of breath.

While the saccular form takes its origin in that growth of connective tissue in the lung known as 'cirrhosis,' where the lung contracts and so draws the bronchial walls apart ; as described by the late Sir Dominic Corrigan. Neither form of dilatation can occur without an atrophy of the intervening

tissue; but the relations which these two conditions bear to one another is still a subject of controversy. In the first-mentioned variety, where there has been a distinct history of chronic pneumonia or pleurisy, we must regard the change in the parenchyma as the starting-point in the process; but in the second variety of general dilatation following bronchitis it is probable that the inflammation of the tubes has originated it. In some cases related by them there is great dilatation of the tubes without almost any lung-tissue betwixt them. This



dilatation, 'like the fingers of a glove,' may be found in either upper or lower lobes.

So much, then, for the changes undergone by the bronchial tubes themselves; alike their walls and their lining mucous membranes.

It may now be well to consider 'cirrhosis of the lung' as one associate of chronic bronchitis; and then, after that, 'emphysema,' which is the pathological condition of lung found with another form. With both bronchial modifications are found, and therewith that increase of mucous secretion

which causes the malady to be spoken of as 'chronic bronchitis,' from its most obvious symptom.

Under the heading 'Chronic Insterstitial Pneumonia—Induration of the Lung—Bronchiectatic Cavities,' Niemeyer gives an excellent chapter in his best form. The nomenclature adopted suggests the view taken. He does not deal with 'Chronic Bronchitis' as such. He regards, however, a preceding bronchitis in those cases which are set up by irritant matters taken into the lungs by the air-passages, as coal-dust, grinders' or masons' fine dust, or other irritant. When the lung-tissue shrinks then the bronchial tubes dilate, and the chest-walls fall in from atmospheric pressure. At first the lung becomes hyperæmic and reddened; but as the vascularity passes away it becomes paler and of a bluish-grey colour. In the early stages there are tracts of young connective tissue; later on, the altered lung-structure becomes so dense as to 'cry' under the knife. The affected areas become destroyed for respiratory purposes by the compression of the air-cells by the contraction of the neoplasm, *i.e.*, the pathological connective tissue.

In cases of anthracosis the lung-tissue becomes permeated by the inhaled coal-dust. Sometimes, however, the blackness is a mere discolouration of the indurated lung extending from the bronchial wall into the lung-tissue. In the workers of French grindstones, known in the trade as 'French burrs,' fine particles of stone are inhaled. But Dr. Peacock, in his investigations into this subject, found no particles of iron in the lungs. Zenker, in a treatise upon the subject, proposed to call a cirrhosis of the lung, due to the inhalation of iron-dust, 'Siderosis.' On the discussion on needle-grinders' phthisis (or 'rot'), at the meeting of the British Medical Association at Sheffield, in 1876, it appeared that no particles of iron were found in the lungs of grinders. (There are two possible hypotheses for this, either (1) the iron particles are too heavy to be respired, or (2) they are dissolved out by the action of

the body fluids, leaving the insoluble stone particles remaining unaffected.) Dr. Peacock found, in the case of the French mill-stone men, siliceous and carboniferous particles in the lungs; some sharp and angular, like other particles found in the dust of the workshops. Like potters who grind china in the condition known in the trade as 'biscuit-ware,' *i.e.*, the burnt clay before any colouring or even glazing is applied. Here fine particles of baked clay are respired, and set up the same bronchial change, extending into the surrounding lung-tissue, as are seen in masons engaged on a small-grained freestone in what is called 'fine hewing,' in which much fine stone-dust particles are respired. In the Cornish miners' phthisis, on the other hand, Dr. Peacock failed to find any foreign matters in the lungs. Lungs may be blackened by disease; and also may be blackened by 'black air' without being diseased. Wilks and Moxon mention the case of a man who for years had worked at the London Docks, where candles and torches were constantly burning, who had bronchitis with chronic pneumonia on one side, whose expectoration was 'very black.' Beyond these well-known cases of interstitial pneumonia and bronchitis being set up by irritant particles respired in a contaminated atmosphere, there is the common 'bakers' and millers' asthma;' the asthma brought on by woollen particles in 'shoddy' districts, or cotton particles elsewhere; that of feather-workers and others, as chaff-cutters, paper-bronzers; many instances of which have fallen under my own notice.

Such irritant particles, mechanically irritant, excite first hyperæmia in the air-tubes and circumjacent lung-tissue; and ultimately, if continued, actual structural changes of marked and well-known character. The first change in the mucous membrane is the flattening out and disappearance of the mucous crypts, rendering it rather a serous membrane with a serous secretion. When bronchiectatic cavities are formed then fluid accumulates, owing to the unyielding character of the thickened lung-tissue around the dilated tube, not being compressed even

by the most violent coughing. This fluid in time undergoes changes which render it very offensive, as seen in the cases called 'fœtid bronchitis.' Sometimes this fœtid matter is got rid of by paroxysms of coughing; the stinking phlegm being quite distinct from that ordinarily expectorated, so that the patients say they have 'two kinds of cough.' There is the wonted cough with inoffensive phlegm; then paroxysms of cough with a most offensive sputum. Sometimes the ichorous pus leads to erosion of the walls of the cavities; or to the formation of sloughs, which, when they are detached by violent coughing, give rise to bronchial hæmorrhage. When the bronchiectases are in the upper portions of the lungs such accumulations are not found.

At other times chronic bronchitis is found with a totally opposite condition of the lung-tissue, viz., vesicular emphysema. In this condition there is morbid enlargement of the lung-vesicles, which are often torn into each other so as to form a crypt or ragged pouch. It is scarcely material in a practical treatise to discuss the rival explanations of emphysema being produced by 'inspiration' or by 'expiration,' which are interesting only to pathologists and teachers in medical schools; suffice it to say it is produced when the respiration is forced or laboured from any cause. Niemeyer, who is fond of talking of 'compensatory changes,' first describes the emphysema of certain vesicles when others are destroyed by changes in neighbouring lung-tissue, or in pulmonary collapse, as a temporary condition. This he calls 'vicarious emphysema.' It is a well-recognised form by most writers. When permanent it is termed 'substantive emphysema.' A certain amount of emphysema of the anterior borders of the lungs is, in my experience, common among athletes. In some cases violent coughing probably distends the air-vesicles. Certain it is, too, that rupture of the lung-tissue betwixt the air-vesicles is common when the tissues generally are impaired, as in the form here termed 'degenerative bronchitis.' This de-

generation of tissues is the accompaniment of age; and in elderly persons every attack of bronchitis, from cold or other cause, which leads to much cough, tears up the lung-tissue. Emphysema is known in early life, after severe respiratory efforts, as croup and hooping-cough, and largely disappears. Indeed, it may be a transient affection to a greater or less extent in early life, when the lung-tissue is elastic and sound; but when the tissues become degenerate and the air-vesicles torn into each other, no repair is possible in the nature of things. Emphysema is commonly found with a catarrhal condition of the lesser bronchi.

Emphysematous lungs are thinner, lighter, and more buoyant than normal lungs. They are larger, and bulge when the thorax is opened. They commonly quite overlap the heart, so that no area of cardiac dulness can be detected on examination; and diminish, notably, the area of liver dulness. Such lungs feel soft to the touch, 'like a pillow filled with down.' They are, too, bloodless and dry when there is also wasting of the capillaries. The vesicles may enlarge to the size of a pea, or even more.

Local emphysema may occur in various parts of the chest. In some asthmatics the area of emphysema is at the back, or it may be determined by neighbouring lung-collapse, or wasting, or by closure of a bronchus.* Contraction rather than dilatation of the bronchi is the condition of the tubes found with emphysema; while bronchial catarrh is commonly present. There is a good deal of hypertrophy of the bronchial muscular fibres also. 'The bronchial tubes are often full of secretion; their walls thickened, with great hypertrophy of the longitudinal fibres' (Wilks and Moxon). While Fuller writes: 'The bronchial tubes are usually dilated in old-standing cases;

* Primary emphysema 'either attacks a small portion of the lung only, being confined especially to the anterior edges of one or other of the upper lobes, or else it spreads over a whole lobe, or a whole lung, or even both lungs' (Rokitanski).

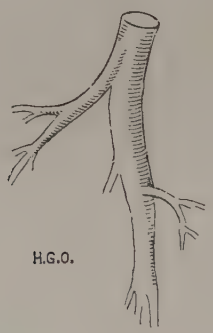
their mucous membrane is pale, and their circular muscular fibres are highly developed.' It would seem, then, that both sets of bronchial muscular fibres may be hypertrophied. Probably the fibres become hypertrophied as a compensatory growth to aid in more complete expiration, and expulsion of the accumulated mucus; the normal elasticity of the lung being much impaired by the emphysematous changes therein.

The wasting of the lung-tissue, and of the capillaries belonging thereto, lead to much venosity and cyanosis; and in some cases a blueness of the face is seen almost approaching the cyanotic hue of congenital heart imperfection. The ultimate changes are vascular changes. Rokitanski says: 'It is easy to understand how it proves fatal. It kills by finally inducing paralysis of the lungs, by asphyxia from the accumulation of air no longer fit for the process of respiration, by paralysis of the heart, or by vascular apoplexy of the brain.' (This last does not mean so much rupture of an artery—though that does occur when the blood-flow in the arteries is impeded by stasis in the capillaries, and a degenerate patch of arterial wall gives way—as venous engorgement.) The danger to life then lies in failure of the right ventricle; a matter which should act as a beacon-light to us, both as to the use of our medicinal agents and the importance of feeding the patient on food adapted to the enfeebled condition of the assimilative organs, gorged with venous blood; itself highly charged with carbonic acid.

There is another complication of chronic bronchitis, which though not frequent is very distressing to the patient, viz., fibrinous casts, from plastic or croupous inflammation of the bronchial mucous membrane. It is more frequent in strumous persons, or patients of the phthisical type, than in the robust or emphysematous sufferers. It may occur as a form of acute bronchitis, or as an acute exacerbation of the chronic condition. Such casts may vary from mere fragments to fibrinous twigs some inches long, casts of the bronchial branch. They

are moulds of the tubes formed by exudative lymph; and not decolourised coagulation from by-past hæmorrhage in the lung. They may or may not be tinged with blood, and their expulsion, after most distressing, prolonged, severe cough may be accompanied by some hæmoptysis. Some are solid, some are tubular. 'However solid these casts appeared to be, they were always found on examination to consist of concentric laminæ, evidently deposited, or rather exuded at different periods, in successive layers; and if placed under the microscope they were seen to consist of amorphous granular matter, intermixed, *not* with blood-globules, but with mucous corpuscles, compound granular cells, oil-globules, and ovoid cells containing dark colouring matter such as exists in ordinary bronchial mucus' (Fuller).

I am indebted to Dr. Orlebar for the accompanying cast from a case in Victoria Park Hospital some time ago, the notes of which will be given further on.



Fibrinous Cast of Bronchial Tube.

The subject of 'Plastic Bronchitis' has been carefully studied by Dr. Peacock, who collected notes of forty-eight cases. His conclusions are as follows: The disease is more frequent in males than females. It is not limited to any period of life. It may attack persons in good health, but is chiefly seen in those who suffer from chronic pulmonary disease.

The acute cases often prove quickly fatal; chronic cases may go on for weeks or months, or recur. Hæmoptysis is no common accompaniment. The twigs are usually of whitish colour, and are from one to three lines in diameter, varying from a small crow-quill to a large goose-quill, and are casts of bronchial tubes of the third or fourth size; but cases are recorded where the main bronchus was obstructed; 'and others in which the false membrane extended from the smallest tubes to the trachea.' The fibrine may be deposited in laminæ. The disease is by no means necessarily fatal, and may readily subside (as in the case quoted above). A 'peculiar flapping valvular sound' is given as its pathognomonic sign. In a case which occurred in a delicate boy of eleven under his care in St. Thomas's Hospital, 'the casts appear to have been first moulded in the smaller bronchial tubes of the upper lobe of the left lung, but, as the disease advanced, the fibrine was either effused from the original seat of the disease in larger quantity, or the disease itself extended, so that the masses expectorated had the form of the main bronchus of that lobe. When first expelled the solid matter formed oblong or rounded bodies, about the size of a filbert, and these, when macerated for a short time in water, gradually unfolded themselves till their peculiar branched form became apparent.' As to the patient's chest, it was narrow and contracted, and 'it is altogether less resonant than natural; and the deficiency is more marked at the left apex posteriorly than elsewhere,' he observes. The boy improved much under treatment. (*Medical Times and Gazette*, Dec. 30, 1854.)

Thus it seems that plastic bronchitis is found commonly with apex consolidation which is not necessarily of tubercular character.

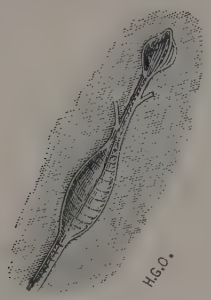
Finally, the bronchial tubes are implicated in pulmonary tuberculosis. Rokitanski describes 'bronchial tuberculosis' as sometimes a primary affection, where the mucous membrane is the seat of tubercle which completely fills the tube; often

producing dilatation of it, with thickening of the fibrous sheath. 'Like pulmonary tuberculosis, it most commonly occurs in the bronchial ramifications of the upper lobes, but it stands contrasted with that affection in frequently occurring in the peripheral branches; it attacks a larger portion of the bronchial tree, and on making a section of the pulmonary parenchyma we find it traversed by thick-walled, dilated bronchial tubes, filled with caseous tuberculous matter. Bronchial tuberculous, although very frequently combined with tuberculous infiltration of the lungs, sometimes occurs as an independent disease. In the latter case the obstruction in the bronchial tubes gives rise to obliteration of the pulmonary vesicles and obsolescence of the parenchyma connected with them; and on making an incision, we then find the obstructed tuberculous bronchi ramifying through the parenchyma in the form of ribands of puckered, tough, elastic tissue.'

Even when the tubercular process is truly pulmonary the bronchiæ may be involved. I am indebted to Dr. Orlebar for a drawing on the next page, which illustrates the connection of bronchial change with caseation of the lung, otherwise pulmonary tuberculosis. Here a fusiform dilatation of the bronchial track is seen with true tubercle in the terminal alveolus. Probably it is not common to find the associated condition so well marked as in this instance.

As the tubercular process advances it involves the capillary bronchiæ first, and then spreads to the larger tubes. When a cavity has been formed by necrosis of the neoplasm, the bronchial tubes remain open where not compressed, and 'the number of bronchial tubes opening into a cavity is generally proportional to its size.' This condition permits of the softened tubercle being readily expectorated. 'The bronchial tubes proceeding to and from the caverns exhibit streaks of mucous membrane in a condition of tuberculous infiltration, and are themselves filled with tuberculous matter; moreover, they are

always in a state of catarrh, with reddening and softening of their mucous membrane, and with a muco-purulent secretion, which constitutes the greatest part of the sputa which are expectorated in the course of phthisis.'



Dilated Bronchial Twig with Caseation in the Alveolus.

Chronic bronchitis is then not only an important disease in itself, but it is an accompaniment of most serious lesions of the lung-tissue.

In practice it is important to discriminate betwixt the 'cirrhotic' form, leaning to the characteristics of pulmonary phthisis; and the 'emphysematous' form where the grave complications arise from consequential vascular changes. The first bears a strong family likeness to pulmonary phthisis, clinically as well as pathologically. The other form bears many points of resemblance to that of mitral bronchitis—*i.e.*, the bronchorrœa found with mitral lesions—and venous fulness; with its long resultant train of lesions and complications caused by venous engorgement. Consequently, our remedial measures must be adapted accordingly in each case. In all, the nutrition of the patient is a matter of cardinal importance. In both we are required to prescribe agents which act directly upon the respiratory centre: (1) to increase the ordinary respiratory efforts; and (2) to give energy to the act of coughing, so that it can remove the mucous accumulation in the air-tubes. Where the vascular system is involved,

agents acting thereupon, as digitalis, are imperatively called for.

Indeed, the practical utility of this review of the pathological changes found along with chronic bronchitis, lies in the indications for treatment furnished thereby. If the morbid changes found with each form are kept well in the mind's eye in the early stages of the malady, much may be done to avert them by rational well-devised measures. If they are only recognised when they have become established, then the time for efficient treatment has passed away—never to return. Pathological research can thus be made very frequently to cast a ray of light along the dark and broken track which lies before many a case ; and by pointing to the pitfalls and the breaks in the track, teach us what to guard against, and what to strive to avoid.

CHAPTER IV.

FORMS OF CHRONIC BRONCHITIS.

Sec—Asthmatic—Catarrhal—Cirrhotic—Emphysematous—Degenerative —Mitral—Gouty.

THE study of the pathological relation of chronic bronchitis fittingly precedes that of its clinical aspects. Chronic bronchitis certainly is not a disease of physical signs merely, but entails observation of the patient generally, as well as of the thorax in particular. For purposes of treatment—the sufferer's errand to the medical man be it ever remembered—the study of the individual is essential; after that accurate observation of the chest is highly desirable. It will be found on physical examination of the chest that the disease assumes various forms according to the individual, and the nature of the morbid changes. Laennec described a certain class of cases as *catarrh sec.* Here there is considerable difficulty of breathing with tightness and oppression at the chest, and much soreness down the sternum. The cough is frequent and harassing, while the expectoration is scanty. There is indeed a distinct disproportion betwixt the amount of expectoration and the effort requisite to bring it up. Such expectoration has been described as 'composed of small semi-transparent, roundish masses of viscid, pearl-like, or starch-like mucus.' In my personal experience it has been chiefly like a little thick gum, of greyish colour, not uncommonly carrying a spec of blood in it; nor is it difficult to see how this comes to pass. The

bronchial lining membrane is turgid with blood, irritable, and swollen, while the secretion is very scanty. A small accumulation of secretion excites cough to remove it. But its removal is not readily accomplished, from its small size and its glutinous character. When expectorated, a small point of blood from a ruptured vessel in the inflamed mucous lining of the bronchus is seen at times in the expectorated phlegm. On examination the breath-sounds are heard harsh and dry. There is much shortness of breath from the lumen of the air-tubes being diminished by the swollen condition of the mucous membrane. The breathing then is laboured. The face gives evidence of distress; while it is injected, and not rarely somewhat cyanotic from defective aëration of the blood. The patient complains of much soreness or rawness beneath the sternum; the subjective sensations harmonising with the pathological condition. The repeated severe cough has tried the muscles of respiration, ordinary and accessory both, until the act of coughing has become very painful. The pain and soreness are especially felt at the upper insertions of the abdominal muscles in front and at the sides. Commonly acute stabbing pain is experienced at one spot. The locality is a point of periosteum, usually on a rib, where a muscular fibre has been torn from its attachment by severe expiratory effort. On each severe cough its growing re-attachment is wrenched off, and this causes the acute stabbing pain. After a little experience of this pain the patient learns to attitudinise himself when the cough is felt to be coming on. The position adopted is one which allows comparatively little tension upon the tender part in the act of coughing; and so saves the wrench and the accompanying pain. The hand is usually pressed firmly on the spot to further lessen the risk of strain tearing the new adhesions which are forming. Anyone who has experienced this complication of 'dry catarrh' keenly comprehends the import of this attitude when assumed by another. Eleven years ago such rupture occurred to

myself; and ere the winter was over the attitude was unconsciously assumed, when the cough was felt to be coming on. The movement had become instinctive. If, from the attention being absorbed with something else, the attitude was neglected, the intensity of the resultant suffering caused the attention to be more devoted for a considerable period after the neglect.

In my experience such dry bronchitis has been almost exclusively an intercurrent condition in persons liable to winter-cough, or the bronchitis of cold weather. Laennec thought dry catarrh common with gouty individuals. My experience, especially when in the North, whether amidst the Westmoreland hills, or at the Public Dispensary of Leeds, would incline to its association with rheumatism of a chronic character. It was most frequent in comparatively robust persons. The attack is usually attributed to exposure to cold; probably quite correctly in most cases.

The aim of treatment is to produce relaxation of the vascular turgescence; with this comes free secretion, and with that great relief.

Dr. Headlam Greenhow, in his well-known work on 'Bronchitis,' relates several cases of catarrh sec. One may be taken as an illustration; and the following is abbreviated from his notes:

'S. S., a charwoman, who had had indifferent health for years, and who had had several delicate children. She had been laid up about nine years before coming under my care with bronchitis; since which time she had been very liable to catch cold, and had almost habitually suffered from cough and dyspnœa. She was a flabby woman, with a large abdomen —just the type of person likely to fall into chronic disease, and to be little amenable to treatment.' The chest was extensively emphysematous, with the liver depressed by the 'over-voluminous' lungs; the heart was displaced backwards and inwards, so that its impulse could neither be felt nor seen;

its sounds were masked by the rarefied lung; the breath-sounds were dry and wheezing; 'no moist sounds, nor anything resembling them were heard at any time during her residence in the ward;' the sputum consisted of 'a slightly frothy, jelly-like, transparent mucus, so tenacious that the vessel in which it was held could be turned bottom upwards without displacing it; the sputum was occasionally streaked with blood.' Under treatment she became much relieved, the cough became less troublesome, and the expectoration decreased in amount, though retaining its characters. 'The patient expressed herself as much relieved, said her breathing was much freer, and that she felt in all respects better. The duration of her stay in hospital is not given.

This is a very illustrative case, more pronounced than any that has come within my own experience. Usually the case ends in relaxation of the turgid vascular condition of the mucous membrane, free secretion, or resolution—the old term for the normal mode of repair. It is really, in the great bulk of cases, a bronchitis in which the first stage of congestion of the mucous membrane, with great irritability and scanty arrested secretion, is unusually prolonged. It requires that nature's processes should be followed, not traversed, in its treatment; which will be described in the concluding chapter. Sometimes the case is very obstinate, and the turgescence is not relieved by such remedies as aconite, antimony, or steam inhalations; though such measures are usually successful.

A young man in Westmoreland, a robust, powerful fellow, was liable to this dry bronchitis, and, after trying other measures in vain, my late father bled him, with the result of immediate relief, and progression of the case through its wonted stages. This occurred twice. When my turn at the helm came, the tenets of the late Professor John Hughes Bennett had taken forcible possession of me, and I scouted resort to the obsolete lancet. The case went on for several days unrelieved by anything that could be thought of, and

the patient entreated to be bled. So bled he was to ten ounces, with the result of immediate relief; the case progressing satisfactorily after that. Resort to the lancet cannot, however, be generally indicated even in intractable cases.

Then there is the *asthmatic* variety, where chronic bronchitis is linked with periods of acute spasm of the bronchial muscular fibre. Here there is a chronic malady often comparatively slight; but the bronchial mucous membrane is sensitive and liable to be affected by colds, or trivial exciting causes, mechanical or chemical irritants, as dust, or fog. Indeed, these two last are frequently the irritant cause of the bronchial trouble. When the mucous membrane swells, a procedure which itself lessens the lumen of the air-tubes, there comes on also spasm of the bronchial muscular fibre, still further lessening the lumen of the air-passages, until a condition of severe distress is established. Such a condition is not rare in young persons, especially girls of the susceptible nervous diathesis. It is not so much linked with ordinary asthmatic attacks, as is found with other evidences of the highly susceptible nervous system. The spasm of the bronchial fibre is excited by local irritation. The cases bear no resemblance, except a faint general outline to casual observation, dissipated on attention, to those cases of recurrent asthma which are catamenial for instance. The attacks are brought on by modifications of the bronchial mucous membrane, and by these only. They are found in both sexes, and all ages. They differ from the ordinary asthmatic attacks in that they are found with a certain amount of bronchial catarrh at all times; though this may be but very slight in some cases, still it is there.

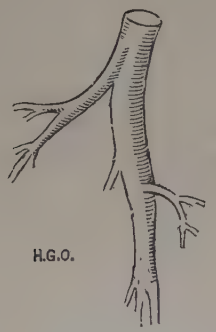
These spasmodic attacks lead to emphysema of portions of the lung, which further enfeebles the patient. The persistent, if inconsiderable, difficulty of breathing impairs the structure of the alveoli, and then, when the strain of the acute dyspnœa comes, a number of the weakened vesicles are distended or

ruptured. When the attacks are severe the patient can be seen to be distinctly worse after each attack, and the downward progress of the case is rapid. Especially is this the case when the pectoral muscles draw the acromion processes towards the sternum, so that the shoulders project forward while the back becomes prominent. Such a condition is bad in every way. The respiration is carried on chiefly by the backs of the lungs instead of by the whole, especially the anterior portions. The muscles which supplement the diaphragm are rendered comparatively useless as muscles of respiration; the ordinary muscles, which are called into play to assist when the respiration is taxed, are rendered of little avail in expanding the chest in front. The muscular arrangements at the back are not adapted to yield much assistance on an emergency; while the lung-structure at the back becomes distinctly emphysematous. Such a condition naturally calls for apprehension if any intercurrent acute bronchitis, or pneumonia should come on. The crippled thorax does not give the patient much resistant power to the impact of acute disease still further taxing the embarrassed respiratory powers, and encroaching upon the limited thoracic space; and when acute trouble comes the condition becomes one of imminent peril, requiring the most energetic measures to combat the tendency to asphyxia.

As to the attack itself, it varies in severity according to the extent of the bronchial spasm. The sensation extends from mere discomfort producing a feeling of irritability at the embarrassment in the breathing, up to an acute sense of suffocation or choking, causing the sufferer to make almost convulsive movements in the struggle for breath. When secretion begins to be poured out by the mucous glands the vascular turgescence is relieved, and with it the sense of suffocation or dyspnœa, as the case may be. There are concomitant changes in the air-passages as well as bronchial mucous turgescence. Dr. Berkart follows Leyden in the view that

there is a fibrinous or croupous exudation into the bronchial tubes frequently found, which 'is merely an exaggerated condition of the catarrhal irritation.' These fibrinous casts of the bronchial tree may either be expectorated as an arborescent twig, or be rolled up into a small ball about the size of a pea; and covered with a layer of mucus, or may be blood.

Where such casts exist the distress is aggravated by paroxysms of coughing to eject the fibrinous mass, which is only dislodged with difficulty, as can be surmised from the nature of the cast as seen in the accompanying plate.



Fibrinous Cast of Bronchial Tube.

Ordinarily, however, and fortunately, such complication is not found; the patient suffering quite sufficient to be very uncomfortable without it.

The attacks last for some time, during which the countenance is injected, as a result of the venous congestion from the obstruction to the blood-flow in the pulmonary circulation. Dr. Berkart says of such attacks: 'The bronchitis of asthmatics is, as a rule, merely an acute exacerbation of a similar chronic process, and this circumstance explains not only the facility and frequence of its occurrence, but also the absence of marked constitutional disturbance. Insidious in its approach, its sole manifestation is intense dyspnœa, which often lasts, with more or less perfect intermissions, for days and even weeks,

long after the vascular engorgement may be reasonably supposed to have completely subsided.' It has not fallen within my personal experience to meet with any case so prolonged as this, the period usually not having exceeded forty-eight hours.

The worst case I can call to mind was a young lady who was seen in consultation some years ago at Croydon. Her countenance was injected, the hue was almost livid; she was bathed in perspiration, yet her temperature was 102°; while her inspirations were not less than 42 per minute, and her pulse was 140. It is needless to say the condition was one of extreme gravity, and collapse from exhaustion seemed impending. The only matter which inspired a scintilla of hope, or comfort was the fact that the right ventricle was known to be hypertrophied from past complications. There was a faint prospect that it might bear successfully the tremendous strain to which it was being subjected. Fortunately it did contend therewith successfully, and the case emerged from the imminent danger into an ordinary bronchitis, which ran its further course without any bad symptoms. It is needless to say that the system did not forget that terrible strain, nor recover therefrom for months after. The only parallel case I have witnessed, where the energy, the determination, and the endurance were equally taxed, was one of capillary bronchitis, and occurred in a patient who was the subject of chronic bronchitis with an enlarged right heart, in the intense fogs of the early weeks of 1880. This case was also in a lady. Both sat up in bed, propped up at the back, with the shoulders fixed so as to allow the accessory muscles of respiration full play, and breathed for dear life. The set expression of their facial muscles told of the determination not to abandon the struggle; the heavy drops of sweat bore testimony to the exhausting nature of that struggle; the dusky hue of the countenance was evidence of the venous engorgement and the imperfectly aërated condition of the blood. Carbonic acid gas in the

blood circulating in the respiratory centre in the medulla, is the stimulus to that discharging motor nerve centre to send out its messages to the muscles of respiration, ordinary and accessory; and in both those cases the cyanotic hue told of the amount of carbonic acid in the imperfectly aërated blood. The respiratory muscles in each case were hardened by past effort; in each case the enlarged right ventricle had been inured to toil laboriously, encouraged by a course of strychnia, digitalis, and iron. The struggle was in each case a desperate one, with the issue long very doubtful. But in each it was ultimately successful; the determination of character, the powerful physique in both being no unimportant factors in the production of the result. Very active measures were called for, and no lack of moral courage was exhibited in pushing those measures. The strength was maintained by free supplies of milk with alcohol. The conflict was in each case prolonged, and the powers of endurance tested to the utmost. And in both the consequences of the strain were felt persistently afterwards; indeed, neither survived very long after this terrible time of trial.

As to the measures adopted in these cases, and advocated for like emergencies, they will be given in the chapter on 'Treatment.' Be it ever borne in mind that desperate emergencies not only justify but demand heroic measures, proportioned to the gravity of the case.

Catarrhal Bronchitis is a common malady in this country of humid atmosphere and rapid atmospheric changes, constituting a most variable climate. The temperature of the respired air varies considerably at brief periods of time, and as the colder season of the year is approached the temperature of the residual air in the larger bronchi is apt to be considerably lowered; and this gives rise to a hyperæmic condition of the mucous lining of the respiratory track, with increased secretion therefrom. Indeed, it is the larger as compared to the smaller bronchiæ which are mainly involved in chronic

bronchitis. There is redness and swelling of the mucous membrane, and therefrom exudes mucus more or less puriform when the condition has existed some time: or frothy, or tenacious, with a streak or two of blood in it, in other cases. The secretion varies much in character and amount. The extent of the respiratory track affected also is very varied. In some cases the affection is limited to a localised area; while in others it extends over the whole of one lung, or extensively implicates both. The extent is important as increasing the necessity for inspiratory effort where a larger area of the bronchial tree is implicated, and the respirations are at once laboured and, in many cases, hurried.

The character of the mucus secreted gives an aspect to the case. In some cases the secretion is copious and easily expectorated; while in others it is scanty, tenacious, and expectorated with much difficulty, and only after laborious acts of coughing. At other times the amount of phlegm expectorated may be small ordinarily, with intervals of profuse expectoration where the bronchial mucus has accumulated in the lower ramifications of the bronchial tree. The mucus gathers until it produces considerable irritation: *i.e.*, so long as it is confined to the dilated tubes which have become accustomed to its presence, little irritation is provoked; but when the accumulation of the mucus is so great as to come in contact with portions of the tubes less chronically changed and comparatively readily irritated, then cough is provoked for the expulsion of the accumulated fluid. The dilated bronchiæ are surrounded by walls of thickened lung-tissue, and these are not readily compressed by the efforts of coughing; consequently, a severe and prolonged paroxysm is required to clear the tubes of their contents. Such paroxysms are very exhausting, but the clearance leaves the breathing improved until reaccumulation excites further cough for its expulsion. Sometimes these reservoirs of mucus become putrescent, either with excoriations and ulcers on the bronchial

wall, or from zymotic infection, and then the sputum is very offensive, and the condition is known clinically as 'fœtid bronchitis.' The ordinary sputa are inodorous and inoffensive;

but when these lacunæ are being emptied the expectorated matter is highly odorous and most offensive. These are the cases where the patients describe their cough as of two kinds, according to the characters of the expectorated matter.

As winter approaches, the cold air within the larger air-passages sets up hyperæmia with increased secretion from the mucous membrane, which is known popularly as 'winter cough.' This varies much in intensity in different individuals. In very many cases it amounts to little more than some phlegm, often only expectorated on rising in the morning, when the mucus which has accumulated in the night is displaced by the change of posture, and so cough is excited. The parts upon which it has slowly formed do not resent its presence; but when change of posture causes each mass to slide from its seat on to parts not accustomed to its presence, then cough is reflexly excited for its removal. After repeated

bouts of coughing the masses are cleared away, and for the rest of the day there is little cough. In others there is rather more secretion, so that phlegm is expectorated during the day. This is the explanation of the 'cough-and-spit' so constantly met with in the manufacturing towns which lie on each side of the backbone of England. Lying high and exposed, the air is cold, often it is humid; and, what is more, laden with irritant particles, mechanical and chemical, from the myriads of long chimneys belching forth dark clouds of smoke. Under these circumstances winter cough is very common with persons who are not incapacitated from following their occupations; but who only are annoyed rather than injured thereby.

Repeated attacks of winter cough, however, lead in time to chronic changes in the affected bronchi. 'As no acute catarrh is so liable to frequent relapses, and exhibits such a tendency to become habitual as that affecting the air-passages, so also the chronic form is especially liable either to relapse into acute inflammation, with an augmentation of intensity, or, on the other hand, to degenerate into blennorrhœa' (Rokitanski). According to these pathological conditions are the symptoms manifested. In some cases the winter cough is accompanied with a rheum rather than a true inflammatory condition of the bronchial lining membrane; and then the patient has profuse expectoration when going about, or keeps the chimney-corner with the spit-cup close at hand.

Or the membrane takes on the more acute inflammatory condition, and the features of acute bronchitis are blended with those of the chronic condition. The patient is confined to the room, or even to bed, and is acutely ill; so ill indeed that life is gravely imperilled, and not rarely extinguished. But the right side of the heart has become decidedly enlarged, and the accessory muscles of respiration accustomed to demand upon them, so that the system often possesses more endurance than it gets credit for; and frequently, by means

of energetic measures, the case pulls through when such result is scarcely anticipated. On the other hand, when the usual condition is that of little demand, and the body-tissues are becoming structurally degenerate, the resistent power is very small, and the patient succumbs before the new demand; sinking almost before the gravity of the situation has been fairly realised.

These acute exacerbations commonly leave the patient much exhausted, and in a generally worse condition, necessitating the habits of an invalid for some time; and subsequently, when convalescence is established, change of air to some sunny southern seaside resort, in order to re-establish the health.

When the acute exacerbation involves the smaller bronchiæ, then a condition of the most imminent danger to life is instituted. That swelling of the bronchial mucous membrane which only involves diminution of their lumen in the larger air-tubes, means partial or complete occlusion in the smaller tubes; and if the area of this 'capillary bronchitis,' as this condition is designated, is large, the patient's prospects of life are quickly blotted out. Such a case is described at page 60.

These acute exacerbations entail measures accurately adapted to their requirements: and what these measures shall be will be described in their appropriate place. They will be arranged so as to follow, not to traverse, Nature's processes. Relief of the vascular turgescence with the establishment of free secretion, readily expectorated, is the first step indicated; after that the respiratory centre has to be kept functionally efficient, so that the inspiratory efforts to breathe, to suck the air through the affected tubes, shall be equal to the task, while the expiratory efforts shall be sufficient to expel the profuse secretion from the air-tubes; and for this last end certain agents, as ammonia and strychnine, are the best measures to be adopted. Good, nutritious, easily digestible food, to maintain the powers, is also essential; and often some

generous wine, not always in stinted quantities, aids most efficiently.

Catarrhal bronchitis involves modifications of the air-tubes, which have been described before (Chap. III.); but it is the morbid changes outside and beyond the air-passages themselves which give to chronic bronchitis its highest interest. These are such as to be divisible into four classes, according to their structural accompaniments.

1. The Cirrhotic Form, where there is interstitial inflammation and condensation of the parenchyma of the lung.

2. The Emphysematous Form, where the lung-tissue is attenuated and the vesicles are torn into each other.

3. The Degenerative Form, where there is general degeneration of the body-textures.

4. The Mitral Form, where there is co-existent mutilation of the mitral valve.

It will now be well to consider each form seriatim in detail, and at some length. The study of pathology and of morbid changes in the dead-house is of no practical value, either to us or to our patients, if it do not enable us to realise the morbid processes going on in the living organism. From the data, the various semeia furnished by the features of the case, do we identify the nature of the disease. The physical signs tell us of the extent of the diseased area—of the nature of the morbid action; the study of the expectoration throws further light thereupon. So far so good. But beyond all this there lies the individual in whom the disease is developed. Some acquaintance with the individual as well as the disease is highly desirable.

In all chronic disease we treat the individual quite as much as the patient. We calculate, from our acquaintance with the natural history of the disease and its associations, what are the precise histological changes going on; and from that again what measures we are to take to counteract and, if possible, to arrest or delay the morbid changes—to stay them

in their course. As an illustration of what I am driving at, I may instance the facts that in cirrhotic bronchitis the features of the case resemble those of pulmonary phthisis in their character and indications for treatment; such as the maintenance of the nutrition generally, and that of the affected tissue especially. While in the emphysematous form the condition of the right heart and the vascular system furnish the indications for the choice of our remedial measures; and the same holds good of the mitral form.

Such being the case, my endeavour will be to depict each form in broad well-defined outlines, so as to clearly differentiate one from the other, in order that the careful reader may be able to classify each individual case when presented to him; always bearing in mind that in actual practice Nature does not invariably preserve the well-marked type, but often presents a hybrid hard to classify. Nevertheless, even such a blend will present more pronouncedly the aspect of one or other form; and its features will identify it sufficiently to furnish good indications for its treatment in detail. For instance, all obstruction to the flow of the blood in the pulmonic circulation leads to more or less change in the right heart, and a huge right ventricle may be found with well-marked cirrhosis of the lung. When the right heart is overtaxed it requires its appropriate treatment; no matter what the primary disease to which it is consequential.

1. The Cirrhotic Form.—This has as its pathological basis a growth of connective tissue in the parenchyma of the lung. Such growth of connective tissue in the viscera gives us the cirrhotic liver, spleen, and kidneys—otherwise the gouty or contracted kidney—and sclerosis of the brain.

This pathological connective tissue varies in quality, and, with that, in vitality; from a form sufficiently good to live permanently, down to miliary tubercle whose presence is incompatible with much further existence. In chapter viii. of my 'Practitioners' Handbook of Treatment, or the Principles

of Therapeutics,' dealing with abnormal growths, I followed Virchow's view, that tubercle is a degenerative proliferation of connective tissue corpuscles; and wrote, 'Tubercle is modified connective tissue—nothing more nor less. It varies from what is called "fibroid phthisis,"—that is, a form of pulmonary tuberculosis, differing but slightly from interstitial pneumonia or cirrhosis of the lung—to masses of cell-growth which swiftly undergo retrograde metamorphosis, or even smaller or miliary tubercles, not unlike frog-spawn, scattered throughout the lungs. In the formation of the higher forms of tubercle the new growth springs from the connective tissue; but in addition, in graver cases, the cell-growth is associated with the lining of the alveoli, and of the lymphatics which accompany the terminal bloodvessels. The lower the form of tubercle, and the worse the case generally, the more does the growth involve the latter structures. Where the growth is confined to the connective tissue chiefly, the condition is rather that of cirrhosis.' It is in fact a difference of degree. Where the growth is of comparatively good cells, but little if at all below the normal connective tissue in quality, it possesses high vitality. Where the cell-growth is greater, but each cell of lowlier character, then the cell-proliferation is such as to have a much lower vitality.

The practical aspect of the subject is best put forward by C. J. B. Williams, who made these three divisions: (1) Euplastic deposits, that is, healthy connective tissue, as cicatrices; (2) Cacoplastic deposits, which are more or less defective in organisability, as ordinary tubercle; and (3) Aplastic deposits, which are too degraded to possess any organisability, and which simply pass along in retrograde changes without any attempt towards organisation. Put into more definite clinical form, we might say, (1) Pure interstitial pneumonia, or cirrhosis of the lung; (2) Ordinary tubercle, or caseous pneumonia; and (3) Acute tuberculosis, or galloping consumption.

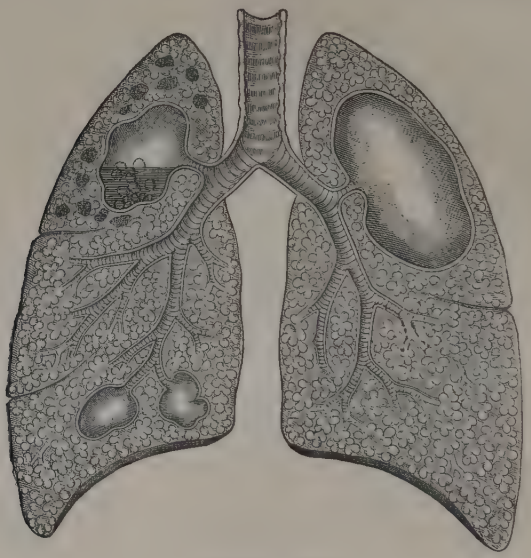
Now we can understand that in cirrhosis of the lung some

of the cell-growth may approach the second form, so that the two overlap, as it were ; and then the cirrhotic lung will give truly phthisical features. Yet the condition still may be mainly lung-cirrhosis ! It is well to bear this in mind, and also Niemeyer's sentence : 'The exciting causes which may give rise to consumption, where predisposition to it already exists, consist, as I believe, in all influences capable of producing fluxionary hyperæmia of the lungs and bronchial catarrh.' Then again, 'The caseous masses upon which the consecutive (secondary) development of tubercles in the lungs depends are situated, in the great majority of cases, in the lungs themselves, and consist of the products of chronic pneumonia in a state of caseous degeneration. We have no hesitation in stating that the greatest danger for the majority of consumptives is *that they are apt to become tuberculous ;*' and 'but even a simple genuine catarrh may extend into the air-vesicles in a person of apparently perfect health and vigour. Healthy men should never feel sure that they will not die of an acute or chronic catarrhal pneumonia, proceeding from a cold, and resulting in caseous infiltration and destruction of the pulmonary substance.'

This last is, unfortunately, only too common : a cold followed by some consolidation of the lung-apex—which may, and often does, clear up, but which may enter upon a downward course. If the general nutrition become impaired, as by persisting dyspepsia, or diarrhœa, then the weak spot becomes so ill-fed that it breaks down in molecular necrosis, and the patient becomes *tuberculous*. The softened matter may be expectorated, and a cavity or cavities form. Such a condition is depicted on the next page ; and a very bad state indeed the lungs are in, as is obvious.

This pathological dissertation points to the practical importance of maintaining tissue-nutrition in the treatment of the cirrhotic form of chronic bronchitis ; tuberculous formation being a danger to be dreaded and avoided if possible.

In some cases chronic inflammation of the parenchyma of the lungs with bronchial implication, may exist in portions of the lung, with true tubercle at, or mainly at, the apex. Dr. Peacock has made a study of 'millstone-makers' phthisis,'



From Da Costa.

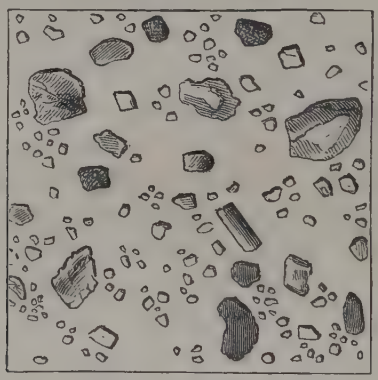
which furnishes some most instructive information, the more that Dr. Peacock's accuracy of observation is universally admitted. At the post-mortem in one case where 'there was found to be some deficiency of the resonance on percussion at the left apex, with obscure tympanitic resonance at the right, bronchial respiration and crepitation at the left apex, and cavernous respiration and bronchus on the right,' it was found: 'The left lung was voluminous, for the most part crepitant, and indeed somewhat inflated. The upper lobe presented numerous grey miliary tubercles, which had a tendeney to run together and form irregular indurated patches of various sizes.' This shows induration in one part, with an emphysematous condition elsewhere. The right lung was universally affected. 'The bronchial tubes of both lungs were

somewhat congested, and contained a large quantity of purulent fluid.' In another case 'the resonance on percussion was found to be somewhat abnormally clear in the mammary and impaired at the clavicular regions. The inspiratory sound was generally feeble, and the expiratory loud and prolonged, and bronchitic ronchi were heard in all parts.' He suffered from cough and asthma, 'presented the usual symptoms of chronic bronchitis, but occasionally spat blood, though never in large quantity.' On post-mortem examination it was found 'both lungs were tuberculous, but the right especially so; and the deposit was so copious at the apices as to render them solid. The tubercles existed in masses, with interposed pulmonary tissue comparatively sound. The lower lobe of the left lung had merely here and there small miliary tubercles, which were especially superficial at the base. In the right lung there were two small irregular cavities containing pus, one in the apex and the other in the centre of the lung, and each about the size of a walnut. In another case, 'the resonance on percussion is defective in all parts of the chest, and the movements are very imperfectly performed. The deficiency is most marked at the apices, and there is sibilant and sonorous ronchus in all parts, but especially at the upper portions.' He got up sputum of a dark colour, had much difficulty in breathing, had lost much flesh, was 'thin and old-looking for his age,' and had loss of appetite with night perspirations. He became weaker, and suffered from diarrhœa before he died.

Now this case has a distinctly tubercular aspect, the lineaments of phthisis pulmonalis well marked; yet in the post-mortem it was found 'The lungs were firmly adherent to the parietes, especially on the upper parts of the chest, where there were very thick and firm attachments. Both lungs were throughout sparingly crepitant, and at the apices were much contracted, solid, and of a dark colour; no tubercles were found in any part, but there were numerous hard, black, gritty masses,

about the size of a split pea, embedded in the tissue, more particularly at the apices and at the right side. The inferior part of the left lung was in the state of pneumonic condensation, passing into suppuration.' As to the bronchi, 'there was not any material increase of secretion, except in the smaller tubes. These were also throughout dilated.'

Here is a case of chronic bronchitis of the cirrhotic form so closely simulating phthisis that, in life at least, there was no means of distinguishing it from phthisis pulmonalis with tubercular deposit; yet the morbid changes were found not to be tubercular in their nature. By the favour of Dr. Peacock I am allowed to give the microscopic appearance of the grit found in the lungs in this case.



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In order to clear myself of any possible bias which might be attributed to me as to the question of tubercular and non-tubercular interstitial inflammation of the lung, I will quote Dr. Peacock's remarks from the report of the 'Transactions of the Pathological Society,' vol. xii., 1860-61:

'Dr. Peacock remarked, that in applying the term phthisis to this form of disease, he used it in a wider sense than that in which it was ordinarily employed. He believed that when a person, predisposed to tubercular disease, was brought up from early life to the millstone-making, the irritation caused

by the inhalation of gritty particles might excite true tubercular phthisis. But when there was no special tuberculous predisposition, the irritation would give rise to chronic bronchitis and pneumonia—the condition often described as broncho-pneumonia—in which the lung would become consolidated, and might ultimately undergo ulceration with the production of cavities, but without any deposit of true tubercle.' This is a very important observation.

He went on further to say: 'In these respects the disease was very similar to that excited by the occupation of dry grinding in the Sheffield cutlery works.'

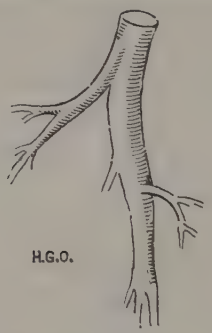
So it is in the stonemasons of Edinburgh, who hew the fine stone of Craigleith quarries; with the scourers of 'biscuit-ware' in the Staffordshire china potteries. So with bakers, millers, leather-dressers, those who inhale fine particles of woollen-dust, and others. They die of lung disease, chronic inflammation with bronchial complications, excited by inhaling mechanical irritants. But it cannot be said that in all instances the cases were tuberculous. Nevertheless, they died with symptoms not always distinguishable from pulmonary phthisis.

I remember well a mason who had done much 'fine-hewing' dying with 'mason's asthma,' complicated by aortic stenosis. In describing to me this 'mason's asthma' from the inhalation of fine particles of stone, my father gave me a rather curious contribution to the history of this subject. He said a certain neighbouring church had been extensively repaired many years before, and some of the masons who had worked at the building had died under his professional care, in his early days, of mason's asthma; and that it was said by them that every man without exception who had worked at that church had died of mason's asthma. The stone was a fine hard free-stone, and the inhaled dust set up chronic inflammation of the lungs in all; no matter what their family history, whether tuberculous or not, the result was the same.

The precise relations of morbid changes within the bronchial

tube to other morbid changes outside in the lung-parenchyma, are not yet fully worked out by pathologists. The following case, which is kindly furnished me by Dr. Orlebar, is, then, of interest. It occurred in an in-patient at Victoria Park Chest Hospital. He entitles it a 'Case of Plastic Bronchitis, with Phthisical Physical Signs.'

'K. L., æt. 20, female.—Family history very good. No relative affected with disease of the chest. History: Measles when a child. Up to two years ago was well and strong, but at that time caught a severe cold, and soon after had aphonia for nearly a year. Much sputum; pain in back; no hæmo-



Fibrinous Cast of Bronchial Tube.

ptysis; has lost much flesh. Has noticed some bronchial casts. On admission: Tall; fairly nourished; cough, and dyspnœa, and aphonia, without hæmoptysis. No sickness, but appetite bad. Pulse 100, weak, regular; no palpitation. Urine normal. Catamenia irregular for the last few months.

'Physical signs: Right at apex showed impaired resonance and increased vocal resonance, and crepitation extending down the back. Left at apex, blowing breathing, some crepitation which is scattered down the front. Heart weak; no murmur. Three weeks later crepitation was heard at both apices, and the temperature ranged from normal in the morning to 100° at night. Casts expectorated. One shown above. A little later the temperature became normal, but casts still

expectorated. Rhonchi heard at left side. Dilatation (?) of bronchus at left apex, from which side the casts came, and some old pleurisy at right apex.

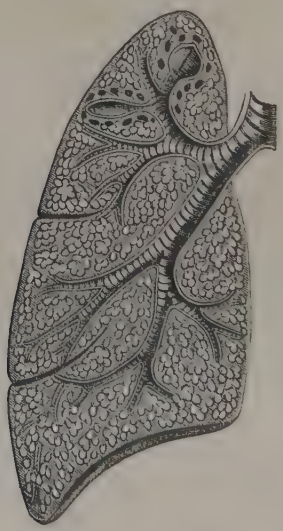
'The treatment included inhalations of turpentine; but after nine days there was no improvement, and the inhalations were discontinued. The ipecacuanha mixture changed to cinchona and acid. General improvement followed, but the casts continued. Carbolic acid in vapour, ten grains to water two pints. No more casts.'

This case, though not followed up by any post-mortem examination (fortunately for the patient), demonstrated that changes in the lung-parenchyma may be accompanied by exudation within the neighbouring bronchi.

Another case, of a totally different character, throws another side-light on the relations of phthisis to chronic bronchitis. An intimate friend of my father's (a medical man) was pronounced by the late Drs. Hope (the authority on Diseases of the Heart), and C. J. B. Williams to be the subject of hopeless phthisis, in 1840. My first memories of him were those of an invalid, thin and feeble. Years rolled on, without any perceptible alteration in his appearance. He still remained, to all intents and purposes, an invalid, of whom every care was taken; and who only ventured to revisit his home in the north in the month of August. There was always a certain amount of expectoration, and at long intervals some hæmorrhage. In 1873 I began to see him frequently. He was then a thin, bowed old man; fond of his corner by the fire, but venturing out on fine days. There was now some emphysema at the back; while in front the apices were deficient in resonance. As he sat with his spit-cup by his side, of which he made constant use, he presented the familiar aspect of a patient with chronic bronchitis. During all these years he held his own, and never looked older than his age; rather the other way, indeed, for he looked a better man for his years in 1872 than in 1850. His intellect was keen and

brilliant, and he was an indefatigable student of his profession as regards its literature. He was a well-marked type of the cirrhotic form of chronic bronchitis, and often exhibited his wasted legs with wistful looks. A bronchitic he certainly was; and he ultimately sank of acute capillary bronchitis, set up by those fatal fogs in the early months of 1879. Here the features of phthisis became blended with and ultimately lost in those of pure chronic bronchitis.

Having thus demonstrated the pathological and clinical relations betwixt chronic bronchitis and interstitial growth in the lung of connective tissue of varying quality, a condition often spoken of as broncho-pneumonia, it may be well to



enumerate its leading characters. It may commence as apex-consolidation; the contraction of the lung-tissue pulling the bronchial walls apart, so as to form a distinct pouch from within; while the traction drags upon the pleura and its adhesions to the chest-wall, therewith producing infra-clavicular flattening or depression. Such a condition of lung is well shown in the above diagram.

Or there may be dilatation of the bronchiæ of the middle and lower lobes, as shown in this illustration.

At this point it may be well to contrast with these two illustrations: one, of apex consolidation, which may, under favourable circumstances, end in resolution; and a little dulness and sense of resistance on percussion, with some harsh breathing, alone tell of the by-past mischief. A second, where the affected lung has broken down with the formation of large and multiple cavities. The reader may profitably contrast the series one with another; which study will render the text all the clearer. In each of the conditions where there are spaces surrounded by thickened lung-tissue the indication of the morbid state is furnished by paroxysms of coughing, or, as Niemeyer terms them, 'coughing-fits,' and the character of the sputum. It is not easy, however, to make a very exact diagnosis as to the precise condition of the lung, for he goes on to say: 'Bronchiectatic cavities at the apex of the lung, lying side by side with tuberculous cavities, cannot be distinguished from the latter even upon dissection, to say nothing

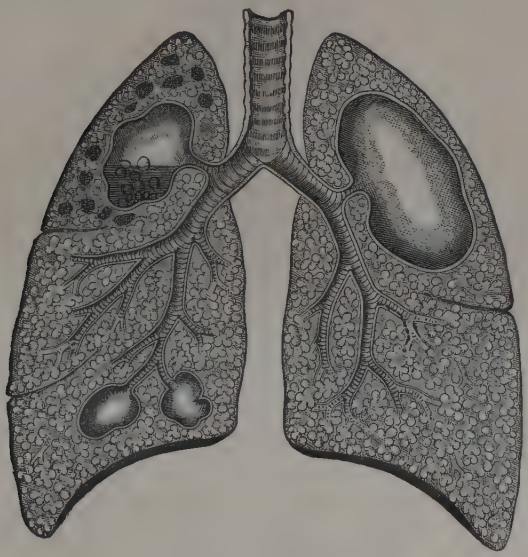
about recognising a difference between them during life.' When the cavities are situated in the upper portion of the lung, they are emptied with comparative ease; when the bronchiectases are in the lower lobes, severe paroxysms are required to efficiently compress the thickened tissue around

From Da Costa.

the dilated tubes. Change of position often produces a marked effect, especially when the change is favourable to the escape of the accumulated fluid from its poison. At times this fluid acquires a most offensive odour, and then the condition is spoken of as 'fœtid' bronchitis. When the fluid is sufficient in amount to well over the sacs, and irritate other portions of the tubes, cough is excited, which empties the sacs. So long as this does not occur, the accumulation may go on for hours. When the patient turns over in bed, a pouch may be elevated, and then its contents run out and excite cough, which empties it. Other pouches then become dependent, and fill; and, in turn, are emptied by alteration of position. Both in phthisical cavities and dilated bronchial pouches, such change of position, accompanied as it is by free

expectoration, is desirable once or twice in the night ; and by such means sound, refreshing sleep may be secured, where without this it is unattainable by narcotics, however varied. It is unnecessary to enumerate the physical signs ; they have been given before in Chapter II.

It is sufficient here to point out that each case will present its own individual features ; and can be read by the light of pathological research only so far as the imagination can erect



From Da Costa.

therefrom an *imago*, or image, of the precise morbid changes as revealed by the physical signs manifested. This is the real service which the work of the dead-house renders to clinical medicine.

Niemeyer makes some remarks worth quotation on the diagnosis of bronchiectatic caverns from tubercular excavations. He writes : 'The following points are to be taken into consideration :

'1. Patients with bronchiectasis are generally free from fever, and hence often long retain a tolerable degree of strength, and suffer but little emaciation.

'2. Secondary disease of the larynx and intestine is of rare occurrence in cases of bronchial dilatation; hence, hoarseness and diarrhœa, in a doubtful case, would indicate the tuberculous nature of the case, although the co-existence of bronchiectasis is by no means excluded.

'3. Saccular dilatation of the bronchi is so often accompanied by emphysema that, in forming a differential diagnosis between bronchiectasis and tubercular excavations, the evidence of the existence of emphysema would turn the scale in favour of the former.'

As to the first point, it is indeed highly important further to carefully interrogate the patient as to the past history in all doubtful cases. Bronchial dilatation goes on along with an internal change, often giving no outward indication except a certain amount of expectoration. While tuberculous excavation involves a period of softening with consequent hectic fever, night-sweats, etc.; when the patient's life was in considerable danger, and which, therefore, can scarcely be forgotten. And a similar softening of other masses produces hectic symptoms during the progress of the case.

This is a very important point.

Point 2 needs no comment.

Point 3 is deserving of thought. The presence of emphysema in one portion of the lung is often the accompaniment of interstitial inflammation, or cirrhosis in another. It is, however, not usually found with consolidation elsewhere, where that consolidation is of a tuberculous character (as in Dr. Peacock's case); rather when it is a less degraded form of pathological connective tissue.

2. The Emphysematous Form.—This is a very common form of chronic bronchitis; and all are familiar with the well-known figure, broad and sturdy, with protuberant chest and abdomen, puffing and blowing, yet busying about often; the face more or less congested, or even cyanotic. At night it is necessary to be propped up in bed for the sufferer to sleep;

and then his sleep is disturbed and broken by paroxysms of coughing. Still he wears on. He is badly injured, but he clings to life, and drags on for years ; if some sharp attack of intercurrent disease do not cut him off abruptly. The very struggle for existence seems to inure the muscles to toil, and to endow them with capacity for endurance.

Yet this familiar figure is far from the sole form of emphysematous bronchitis we encounter. I have in the Victoria Park Hospital at the present time a girl of twenty-two, whose thorax is distinctly barrel-shaped, with a face deeply venous, if not quite cyanotic, and hands showing a decided tendency to 'clubbed fingers.' (These have been described as belonging to phthisis and to mitral disease exclusively; but this case shows that the 'clubbing' is related to venous congestion, no matter how produced ; for repeated examination gives no hint or suspicion of mitral complication.) The chest is almost tympanitic, and the liver displaced downwards ; while the area of cardiac dulness has disappeared. Over the whole of the chest rhonchi can be distinctly heard. She is indeed a typical case of chronic bronchitis of the emphysematous form, albeit but a girl. Nor is there any history to be elicited which throws any light on the etiology of the case. She has been ill, as she is now, for six years ; that is all that can be learned on the matter.

Emphysema is a common concomitant of chronic bronchitis, as it may be of any disease which entails forced respiration. Much time has been spent in discussing the rival theories of 'inspiration' and 'expiration' as the cause thereof. Good names carrying weight with them are ranged on either side. Perhaps the expiration view best explains emphysema in the upper portions of the lungs ; the air being forcibly driven into them in the violent expiratory efforts of cough ; seen in cases of chronic bronchitis of the middle and lower lobes especially. On the other hand, in the emphysema of the anterior edges of the lungs so commonly found in

athletes and those who are accustomed to make severe efforts, there is no history of cough with violent expiration as a cause; and forced inspiration must be accepted as the probable exciting cause.

No age of life is exempt from emphysema; and though it is common in middle age and increases with advancing years, still it may occur in childhood as a consequence of bronchitis, or hooping-cough. Dr. William Gairdner has pointed out how it may be a compensatory change to cirrhosis of the lung-apex.

It may be complete, or it may be partial. In many cases where the back becomes prominent, emphysema is found at the back of the lungs, while the front of the chest is contracted. This is well seen in a patient, a young fellow who has some bronchitis perpetually and unintermittently, with very severe asthma at intervals. Each attack of asthma leaves him in a distinctly worse condition; with his back more bowed and more pronouncedly tympanitic, and the shoulders thrown more forward.

When the vesicles of the lungs are enlarged, or extensively torn into each other, the thorax undergoes some modifications worthy of consideration. Such injury to the lungs limits the thoracic space as regards the amount of air passing in and out of it at each respiratory act, or the 'tidal' air. The limited movement on expiration, as well as inspiration, is readily noted in a well-marked case. The thoracic movement is seen to be distinctly limited. On the other hand, the accessory muscles of respiration in the neck stand out at each inspiration like cords; hypertrophied by protracted demand upon them. The thorax is lifted bodily upwards by them. At the same time the diaphragm is dragged down. This is well seen by watching a sufferer from bronchitis and emphysema when asleep. The abdomen is seen to rise and fall with the respiratory act; just as the upper portion of the chest of a young woman rises and falls with the respiration. Especially is the abdominal

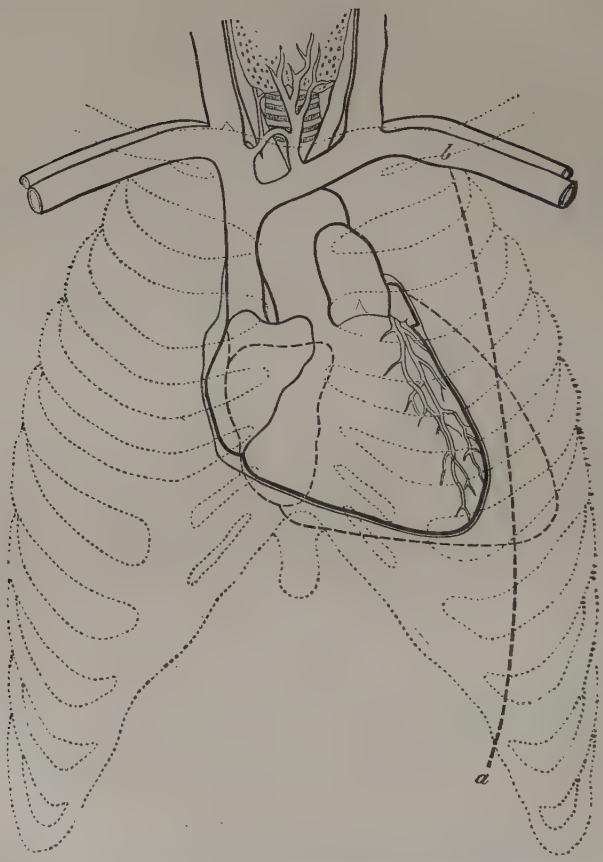
movement noticeable if the hands are folded upon the belly. The thoracic space is consequently increased from above and below, and the emphysema compensated, so far as this is practicable.

These are two important points of which the eye takes note in emphysematous cases. When the ear further detects rhonchi, the broad diagnosis is made without reference to, or call for, physical examination. This in its turn tells of heightened resonance on percussion all over the thorax (in typical cases), especially over the region of the liver. The liver is displaced downwards. In this change of position there are two factors in action as exciting causes. There is (1) the forcible descent of the diaphragm on inspiration; and (2) the pressure of the voluminous lungs, preventing the ascent of the diaphragm on expiration. Between the two the liver is displaced downwards, one, or two, or even more costal interspaces. The liver dulness is not detected till far below the normal line which is at or about the fifth rib. Further, there is little or no area of cardiac dulness to be made out by percussion. The emphysematous lung driven down between the chest-wall and the heart, abolishes more or less completely the area of cardiac dulness. When the costal cartilages are ossified, or, to speak more correctly, 'calcified,' then the heart cannot be found either by palpation, or inspection, or percussion. The indurated chest-walls do away with the first two; the emphysema with the third. Yet on auscultation the heart may be heard beating steadily away, and the radial pulse may be good.

The heart may be somewhat displaced, lying more horizontally in the chest than it normally does, with its apex pointing some distance away to the left of its wonted position. This is a diagnostic matter well worth bearing in mind. It is well exemplified in the following plate of the hypertrophied heart, taken from my work on 'The Heart and its Diseases.'

Nor does the fact of the heart being hypertrophied here

render it out of place. In most cases of emphysematous bronchitis there is the hypertrophied heart, the accentuated second sound (both aortic and pulmonic), and the hard arteries of the 'Gouty Heart.' When the right ventricle alone is



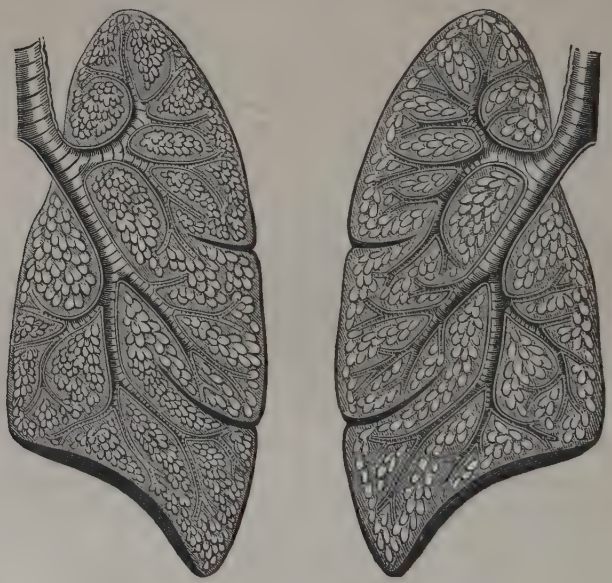
Hypertrophy of the left ventricle. The continuous line marks the normal heart; the dotted, the increase; *a*, *b*, linea mammillaris sinistra.—From Von Dusch.

hypertrophied the apex does not extend so far to the left. The enlarged heart almost rests upon the liver; and the line of demarcation betwixt heart-dulness and liver-dulness is badly defined.

Beyond the general aspect there are other points of difference betwixt the emphysematous and the cirrhotic forms of chronic bronchitis. In the emphysematous form there is little bronchial dilatation with thickened lung-tissue around the dilated tubes (see p. 42), which causes severe paroxysms of coughing, before the elastic pressure of the air in the lungs can compress the thickened parietes of the bronchiectases sufficiently to expel their contents. There is, too, more persisting shortness of breath with emphysema, without paroxysms of profuse expectoration. There is rather laboured breathing 'with considerable wheezing.' There is no dragging outwards of the air-tubes from contraction of circumjacent lung-tissue. Still Fuller writes: 'The bronchial tubes are usually dilated in old-standing cases; their mucous membrane is pale, and their circular muscular fibres are highly developed.' The distending force of the elastic air, it would appear, first enlarges or ruptures the air-vesicles, and this in time acts upon the air-tubes. This distending action, however, is antagonised by the hypertrophy of the circular muscular fibres. The lungs are voluminous, and instead of the thoracic parietes falling in, as in the cirrhotic form, the chest is increased on mensuration; and the intercostal spaces may bulge. The upper portion of the chest is pressed outwards, while the floor of the chest is forced downwards. When the chest is opened on post-mortem examination the lungs project from the cavity of the chest, as if too big for their prison chamber.

The emphysema may be partial, or it may be general. Diagram A (p. 86) shows the middle lobe to be emphysematous; while the upper and lower lobes are normal. Such local emphysema may occur when the upper lobes are the seat of chronic interstitial pneumonia, known as apex-consolidation; as is well seen in a patient in Victoria Park, who also presents the phthisical aspect very pronouncedly. Indeed, observation demonstrates that emphysema is really found under circumstances far different to what is usually supposed.

Diagram B shows the emphysema when general, and demonstrates how it is the upper chest-wall or roof of the thorax is driven outwards and the floor of the thorax forced downwards. In such cases there is often a supra-clavicular bulging with resonance, from the lung-apex projecting above the clavicle behind ; driven up by the violent respiratory efforts. In some cases little vesicles, or bladders, of lung-tissue project from the surface of the lung in front ; either sessile or pedunculated. It is said these occasionally burst and cause pneumothorax.



A B

These voluminous lungs have thin tissues betwixt the enlarged vesicles, and in these the capillaries are largely wasted ; so that the flow of blood in the pulmonic circulation is impeded, and changes in the right heart and venous system brought about secondarily therefrom. Such dry lungs are credited with producing a dry crackling (as Laennec pointed out), or 'a dry grating friction sound' (Walshe and others), on dis-

tension by inspiration. The accompanying secretion in the bronchiæ, in chronic bronchitis, gives rhonchi ; local or general, according to the nature of the cases.

In the emphysematous form of chronic bronchitis the tendency to death does not lie in malnutrition, as in the cirrhotic form. Indeed the sufferer may remain well nourished, even rather stout. There is the venosity which is antagonistic to tubercle (Rokitanski and others). (Sir Thomas Watson is happily facetious on the folly of attempting to avert phthisis by the artificial production of emphysema.) The changes here to be averted, so far as possible, are those which arise from venous fulness (see p. 29).

But a few words as to the pulse may not be out of place. When there exists obstruction to the blood-flow in the pulmonic circulation, a small quantity of blood only reaches the left ventricle, and so the radial pulse is small and compressible, often slow. The veins are full, as seen in the dusky hue of the countenance, the deep-coloured, dark lips, and the thick, coarse nostrils. But when there is also the gouty heart and tense arteries, the blood-pressure within the arteries being abnormally high (of which the copious flow of urine is the best gauge), then the radial pulse is firm and incompressible ; still slow, however. When there is venous fulness, with unfilled arteries, there is congestion of the viscera, and scanty urine, laden with lithates, resembling the urine of cardiac dropsy.

This venous congestion of the viscera leads to much impaired assimilation in advanced cases. The liver, as has been said before, is displaced downwards ; and this leads to modifications of its functional utility. As normally located, the liver occupies a warm nook, safe from exposure to cold. But when driven down, and still more when enlarged from venous fulness, a great portion of this viscus is only covered by the thin abdominal parietes ; and so is exposed to chill. Such chill still further impairs its action ; and mal-assimilation from

defective action of the liver is the result, with lithates in the urine. This is all the more liable to occur because the emphysematous bronchitic is a 'chilly' being, never almost comfortably warm; and so a general low temperature leaves the liver all the more sensitive to thermometric changes, in its exposed condition. (This matter, in cases where there is emphysema, is far too little thought about in practice.) Then there are other visceral complications from venous engorgement, as described in Chapter III., which render the dietetic management of such cases scarcely less important than the medicinal measures to be employed. The desirabilility of keeping the house warm in cold weather is obvious; and also the necessity for warm underclothing, and especially a flannel belt to cover the liver and the kidneys. Such measures are quite as important and far more practicable than compressed air, or even mechanical appliances as that of Hauke, as modified by Dr. Berkart, or that of Waldenburg.

Sufferers from the emphysematous form of chronic bronchitis are, in many instances, subject to paroxyms of true nervous asthma, as might be conjectured from the hypertrophy of the circular fibres of the bronchial muscles. Then there are times when, from cold or exposure, the bronchial mucous membrane is swollen, and the lumen of the tubes diminished, which cause much suffering; until the turgesence is relieved and free secretion established. Attacks of severe palpitation, due to taxation of the enlarged right ventricle, also occur, and alarm the patient; nor is it difficult to conceive that this should be so. Flatulence, with the pressure of the elastic gas upon the right ventricle, also is apt to cause palpitation, or other cardiac disturbance. Straining at stool often provokes dyspnœa.

Emphysema is, from its nature, a progressive disease; and every attack of intercurrent bronchitis leads to further tearing of the lung-tissue, and leaves the patient worse. In comparatively young persons with healthy lung-tissue much strain from coughing and laboured respiration is well borne; and

probably much repair takes place from the elasticity of the lung-tissue when the bronchitis has settled down; and many of the distended air-vesicles largely recover their normal size. But as age advances this tolerance is lessened, and the reparative power wanes; until each attack of intercurrent bronchitis leaves the patient notably worse. This is markedly seen in that condition of general tissue-degeneration found in some emphysematous persons.

3. The Degenerative Form.—Chronic bronchitis is at times a rheum from degeneration of the cell-elements of the mucous membrane. Sometimes it is profuse; in other cases the amount of secretion is little above the normal. There is, further, a widespread tissue-decay throughout the organism. The skin looks greasy or abnormally dry; the temporal artery is thickened and tortuous; the pulse is irregular, and the heart is, and fairly may be suspected of being, the seat of mural decay. There may, or may not be albuminuria. The patient wears the general aspect of degenerative decay. The gait is feeble, unsteady, or tottering; indicating the impaired condition of the muscles. There are, too, evidences of brain-impairment, physical and psychical. Indeed there is a general resemblance to a rotten branch; or rather, the aspect of the patient bears the same relation to that of a person of healthy tissues, that a rotten branch of a tree bears to a sound branch. Such persons usually belong to a good position in life, where every care can be taken of them; or are found in asylums for the aged. Nor could they well be elsewhere, for existence in them is simply incompatible with any exertion or exposure. Life with them hangs by a thread, and a frail thread too.

The late Dr. Basham studied this condition carefully, and the accompanying plate is taken from his well-known work on 'Dropsy.'

It 'represents the fatty decay of tissues observed in cases of emphysema and chronic bronchitis terminating in dropsy.

'Fig. 1 is a portion of the vesicular structure of an emphy-

sematous lung, showing the numerous fat-grains deposited in it.

'Fig. 2 represents sections of the bronchial mucous membrane, showing the successive layers of cells degenerating as they approach the free surface, to be thrown off as mucus and pus-corpuscles mixed with large granule-cells and aggregations of disintegrated nuclei, represented in Figs. 3 and 4.

'Fig. 5 illustrates the fatty condition of the coats of a small artery leading to an emphysematous patch.

'Fig. 6 represents a state of fatty degeneration of the muscular fibre of both auricle and ventricle of the right side, and is typical of what may be seen in most cases of dropsy with dilatation of the right cavities, complicated with emphysema and chronic bronchitis.'

Dr. Basham continues: 'So far back as 1848 Mr. Rainey communicated to the Royal Medical and Chirurgical Society a paper on "The Emphysematous Lung" (vol. xxxi. p. 300), in which he distinctly showed that a fatty degeneration of the fibro-serous elements of the air-cell was the obvious condition of emphysema; and he sums up a most excellent paper by stating that the form of emphysema he describes, originates in a morbid process going on in the pulmonary membrane, which is essentially a fatty degeneration. It is remarkable that the subject of the degeneration of pulmonary tissues in emphysema and chronic bronchitis has received but little notice since that date.' (This he wrote in 1866, but it still holds good.)

'The drawing was made from strongly-marked typical cases of emphysema and chronic bronchitis with succeeding dropsy. I have found the same appearances in every case I have examined. Emphysema and chronic bronchitis are so intimately connected the one with the other—the emphysematous patient constantly suffering from bronchitis, acute or chronic, and the lungs of the sufferer from chronic bronchitis so often becoming emphysematous—that in relation to a state of the heart which is followed by dropsy, they may be taken as

identical. All these cases of dilatation of the right side of the heart, with resulting dropsy, are dependent on an extensive fatty degeneration of the entire heart—not here and there a few filaments fatty, but every bundle of fibre alike degenerated and decayed. Coexistent with, and perhaps as a cause of, the pulmonary disturbance (defect), there is probably going on simultaneously in both lung and heart the same process of defective nutrition. I think we may now more clearly comprehend why, in these instances of mechanical impediment to the flow of blood through the lung, the heart, in the place of becoming, for a time at least, hypertrophied and thickened, becomes dilated, attenuated, and feeble; why the heart, instead of compensating by a more powerful contractile and driving power, and overcoming the impediments in the lungs, itself becomes more feeble, and yields slowly but surely to the dilating power of a venous accumulation. Its nutrition fails, and its walls are degenerating in the direction which seems to constitute an inherent law of the organism. The organism has indicated that the decaying process has already commenced, and probably, step by step with the degeneration of the pulmonary tissue, there goes on an equal, coexisting decay of the muscular elements of the heart.'

'Here therefore, as in renal dropsy, we recognise not a local but a general disorder—a deterioration of cell-development not confined to one tissue, or organ, but widespread, and signifying to us in studying the pathology of those disorders, that it is not to the organ which gives the most prominent indication of disturbance that our examination should be limited; but, if we are to render available the results of our observations for the purpose of treatment, we must take into consideration the evidence which has been here offered, that in these dropsical diseases we have a decaying vitality—a decreasing power of elaborating, or forming out of the elements of food, cells fitted for, and equal to, the performance of their several functions.'

Many years ago I read Dr. Basham's book and was particularly struck with this chapter on dropsy 'connected with disease of the heart and lungs;' often has it been re-read. By its light I have been enabled to recognise a widespread tissue-degeneration in cases where no dropsy ever showed itself; as well as in those where it ultimately was present. Throughout the organism the formative power is waning, and degeneration pervades the whole tissues. The costal cartilages are calcified and oil-globules are scattered throughout the degenerated cartilage; the muscular fibre of the heart is rotting, if not rotten; the structures of the lung are no longer sound, but ill-nourished and readily torn; while the mucous membrane is also the seat of morbid senile change, the cells being of a degraded type. There may, or may not be kidney-casts in the urine, telling of this structural impairment by their constitution, as Dr. Basham points out. Their presence or absence is immaterial; their presence, however, furnishing corroborative testimony of the most convincing character. Just as in some cases blood-decay is the pathological factor—'the life of all his blood is touched corruptibly'—so in other cases there is a widespread tissue-degeneration.

There is also some bronchial rheum, with dyspnœa on exertion, as the prominent symptom; but only the most conspicuous item of the case. General tissue-rottenness, in plain Saxon, is the disease essentially. To a careless glance these decayed beings present no significant aspect; but to the trained observant eye the general decadence is obvious enough. The first test, a little cold with some obstruction to the blood-flow in the lungs, and the mural decay of the right heart is revealed. Scarcely is it realised that these persons are ill, before it is all over. 'The apple will fall when it is ripe enough, no matter what shakes the tree,' is an old proverb. So it is with these overripe tissues. No matter what the malady, or almost how trifling, the right heart stops. The organism is like a rotten beam; it looks well

enough to a casual glance, but the least strain on it and it snaps.

Now as such decaying organisms usually occupy a good social position and are important patients, in every way as well as in scientific interest, it behoves the practitioner to realise fully this widespread tissue-degeneration, and its unfitness to bear any strain. So that when any ailment, however trifling, shows itself, probably the result will be speedy collapse from over-distension of the right ventricle. Even straining at stool is fraught with danger, and not uncommonly is actually fatal. Dr. Basham speaks of our acquaintance with the pathological condition 'for the purpose of treatment;' but these cases contain little hope of anything being done for them, except the preventive treatment of the avoidance of all strain on the rotten fibres of the heart, especially the right ventricle. Indeed in these cases of degeneration, general and widespread, the prognosis, when any illness shows itself, is utterly bad. The very systemic quiescence is ominous of decay. A subtle process of cell-degradation is going on, which usually is suddenly revealed by death from slight causes. It is widely different from, indeed contrasts with, those cases where a long struggle has produced hypertrophy of the heart, of the fibres of the diaphragm, and of the accessory muscles of respiration; and where endurance is established. The one struggles on, battling hard, gamely carrying on a losing fight; but the other gives in and collapses on the first summons to surrender. It is, in short, the difference betwixt healthy tissue and that which is the seat of the justly dreaded fatty degeneration. But such patients are not easily managed; they are fond of their own way, intolerant of opposition, and often very touchy about any allusion to their failing health; they disguise from themselves the import of any sensations which they experience; and do not thank anyone to point out to them what they themselves do not wish to see. It is very necessary to walk warily with them. The brain shares in the

general impaired tissue-nutrition, and irritability with suspicion, a part of the doubtfulness ever present, is the pronounced mental attitude. They even resent hints to take care of themselves. On the other hand, however, some get unnecessarily apprehensive, and coddle themselves to the absurd length of *Punch's* old gentleman who was sure he had caught cold from leaving off his hatband. Nevertheless whatever the form, these sufferers are equally difficult to manage, as a rule.

Very commonly there are evidences of a dilated heart, especially in old ladies, which give certain features to the case; but underneath these there are indications of tissue-decay stealthily progressing, which must not be overlooked.

4. The Mitral Form.—The complication of some mutilation of the mitral valve with chronic bronchitis is much more common than is generally supposed. The bronchial sounds obscure or mask other sounds; and the murmur may be heard over a very small area only. Especially is this last the case where the disease is of the nature of a stenosis, the narrowing giving rise to an obstructive murmur. This is usually heard over a very limited area; and the thrill so characteristic of the lesion when present, is commonly absent. Speaking broadly, I should say the thrill is much more commonly found in young subjects of mitral stenosis, than in old subjects. To trust to it then is fallacious: and it has been made far more of than, in my experience, the actual facts warrant. Probably this misplaced confidence has misled the medical man as to the actual condition in many a case of mitral stenosis in elderly persons. The pulse in mitral regurgitation usually puts the observer on his guard; but in commencing mitral stenosis there is nothing in the character of the pulse to excite suspicion—Geo. Balfour to the contrary, notwithstanding.

There is something about mitral stenosis in persons advanced in life that I am anxious to insist upon. Under the

title of 'The Gouty Heart,' I have described a series of pathological changes in the heart and arteries co-existent with a morbid process in the kidneys. The heart is hypertrophied at first; there is a high blood-pressure in the arteries, which leads in time to atheroma, and the hard incompressible radial artery. The aorta loses its elasticity as the morbid process progresses, and the blood-flow into the tortuous coronary vessels is impaired and sluggish; the hypertrophied heart is badly nourished, and then fatty degeneration of its walls follows; sometimes apace, more commonly but slowly. This series of pathological correlations and sequences has received the sanction of other observers; and Dr. Da Costa in a recent article in the *American Journal of Medical Sciences*, October, 1881, entitled 'The Nervous Symptoms of Lithæmia,' writes thus: 'Or his kidneys and his heart may become structurally involved; the heart making its affection manifest by association with the signs of high blood-pressure in the arteries, its perverted rhythm, the accentuated second aortic sound, the growing evidence of hypertrophy and mural degeneration, in a manner so brilliantly described by Fothergill.' Reader, kindly pardon the vanity of a flattered author and observer. Such recognition is agreeable!

To proceed. Aortic valvulitis, the result of strain, is commonly found with the gouty heart; this is generally admitted. But continued observation tells me in unmistakable accents that mitral valvulitis is also frequently found with the gouty heart; either in company with aortic disease, or alone. And, further, that the form assumed is that of stenosis very often, and not regurgitation. The area over which the obstructive mitral murmur is heard is usually limited to a point at or near the right apex, and especially is this the case when the mutilation is small. Consequently, it is often overlooked.

This mitral lesion is a very important factor in the treatment of the case when discovered. Diagnostically, prognostically, therapeutically, that ominous little 'whiff' when heard is of

great importance. It tells that the strain on the mitral valve-curtains on the contraction of the hypertrophied left ventricle, has set up valvulitis; and further that it is a valvulitis of the progressive form, certain to advance from bad to worse. Consequently it is matter to be carefully sought for; and, if necessary, to search diligently by putting some strain upon the heart by an effort. Such strain will often make the cardiac muscle stagger or falter, and a modification of the rhythm tells of commencing mural decay; or it may, by producing a temporary distension of the ventricle, and with that enlargement of the mitral ostium, reveal, by the evidence of a passing murmur, the fact that the mitral flaps are already the seat of disease which will distort and mutilate them further in time. That is, when the lesion is insufficiency with regurgitation.

In other cases the mitral lesion, whether stenosis or insufficiency, has a definite starting-point. An attack of bronchitis in an elderly person is followed by failure of the powers, felt after the symptoms of the bronchitis itself have passed away; and on minute examination the significant mitral whiff is audible. This was well shown recently in a patient of mine, a stalwart Yorkshireman. He has been under observation for gouty symptoms for four or five years. In October last he presented himself, complaining of feeling less inclined to bestir himself than of yore, and of not being equal to the exertion he previously took and enjoyed. He said it dated from a severe cold last winter. At the right apex a faint murmur could be heard, the herald of coming trouble. A day or two afterwards a patient presented himself for the first time with a similar history. He had, however, some bronchitis still remaining. There was dropsy, with enlargement of the liver. Under appropriate treatment, a fortnight later he showed himself 'very much better.' A week later I received a note to say he had died 'suddenly' without any explanation of the circumstances; probably from some indis-

cretion, some neglect or breach of the orders given, into which the friends do not care to enter—a far from unusual event.

In my Westmoreland experience it was quite common to find a sharp attack of bronchitis followed by a mitral lesion and a condition of chronic bronchial catarrh, which embittered the last years of the patient's existence. When such a sufferer caught some new cold in the form of an acute attack of bronchitis, he or she soon succumbed. Once expressing my chagrin at this result in several cases where I had hoped the patient would ride out the storm, the late Dr. Pearson, of Penrith, a man of great shrewdness, told me that it was his experience that such patients always sank quickly. After that my treatment included some digitalis for the heart's needs, and less disastrous results were frequently attained.

Now in the mitral form of chronic bronchitis the catarrh is not merely the result of venous stasis or fulness of the pulmonary vessels, but is also due to modification of the lining mucous membrane of the air-tubes. Mitral disease is common in young persons ; and though there may be much pulmonic congestion, evidenced by the accentuation of the pulmonary second sound, and shortness of breath from impairment of the thoracic space by the excess of blood in the lungs, producing the typical 'heart cough ;' there is no catarrh. That the catarrh is not effusion from the congested pulmonary circulation, is demonstrated by the fact that digitalis relieves the condition. There may be fulness of the bronchial veins, a part of the general venous engorgement, as a factor, but it is a secretion rather than exudation in most cases : it not being denied that an exudation factor may be present at times. It is chronic bronchitis complicated with a mitral lesion—not a mere exudation from the full radicles of the bronchial veins. But the presence of that mitral lesion is a matter to be borne steadily in mind in the treatment of the case.

Such, then, are the pathological associations of chronic

bronchitis as regards gross, tangible, morbid conditions. It remains only to discuss another association of chronic bronchitis, a certain modification of the blood, known as gout, lithiasis, or lithæmia.

Gouty, or lithæmic bronchitis. The recognition of the relations existing betwixt bronchitis and gout is a matter of modern times. Sir Charles Scudamore says nothing of bronchitis in his famous treatise on 'Gout.' Sir Henry Holland observed it, and wrote on it; and Dr. Headlam Greenhow has placed the matter beyond doubt or cavil. My personal acquaintance with the matter arose from my testing the acidity of the sputum as an indication for the exhibition of alkalies in the treatment of cases of chronic bronchitis in my early days; and very useful I found the practice. When the scene of my labours passed from the Westmoreland hills to the Leeds Public Dispensary, I found a number of cases of chronic bronchitis, especially during the winter months, in stalwart individuals, which did not do well on the routine cough-mixtures of the institution. Very frequently there was coexistent dyspepsia, or some skin affection. A suspicious family resemblance pervaded them; and on substituting a mixture containing potash for the ordinary cough-mixture, the improvement, so inaugurated, strengthened the suspicion into a conviction. Further experience corroborates the view, and Dr. Greenhow's observations rivet the conclusions into a fixed certainty. Bronchitis may alternate with articular gout, or with eczema, notoriously associated with uric acid. Dr. Greenhow says: 'I well recollect a striking example of this alternation in the case of an elderly man who was long under my care. His ailments were gout, psoriasis, and bronchitis, and he was rarely or never free from all of them. No two of the three ailments ever coexisted in his case; but it would happen that, just as he was congratulating himself on having got rid of the gout, his skin would become covered with psoriasis, and this in a few weeks would take its departure, and be

succeeded by an attack of bronchitis.' This is a very clear history.

From my own experience I should feel inclined to say that the gouty factor was markedly present in 'winter-cough;' and that the oncome of cold not only increased the secretion from the bronchial mucous membrane, but also checked the action of the sudoriferous glands, which certainly excrete uric acid, and this arrest increased the amount of uric acid in the blood; some of which found its way out of the body by the bronchial flux. Certain it is, whether this explanation is fully satisfactory or not, gouty persons with bronchitis are worse in winter, as regards their bronchitis. The fact remains. Dr. Greenhow remarks of a case that the patient suffered severely in hot weather; and goes on to say, 'Three of the severest cases of asthmatic bronchitis I have ever seen were in persons who had contracted the disease in hot climates—two of them in Brazil, of which they were natives, the other at the Cape of Good Hope.' This seeming inconsistency is in harmony with other gouty eccentricities. Some gouty persons are worse in cold weather, probably for the reasons just given; others again are worse in warm weather, from deficiency in oxygenation leading to excess of uric acid, by non-removal.

In gouty bronchitis Dr. Greenhow holds that the patients 'habitually raise in the early morning, and it may be at rare intervals during the day, little pellets of tenacious, bluish, starch-like mucus, sometimes studded with darker specks arising from admixture with carbonaceous matter. This ailment, which may perhaps be too slight to attract the patient's attention, is quite compatible with good health in all other respects; but it is, nevertheless, proof of an abnormal condition of the bronchial membrane.' The cough, on getting out of bed in the morning, is caused by phlegm which has accumulated in the night, possibly in dilated bronchiæ, and which is dislodged on change of posture, exciting cough for its removal. Such morning cough often leads to vomiting.

It is commonly complained of by bronchitic patients; and is relieved by a cup of hot fluid taken at once on rising.

There is one point about 'gouty bronchitis,' on which I should like to lay some stress, and that is the presence of nocturnal dyspnœa. The patient is awakened out of sleep by an attack of dyspnœa: in some cases occasionally, in others commonly, or even habitually. Now attacks of cardiac asthma in mitral disease come on also in the night.

I have written elsewhere: 'Now a word or two about the attacks of nocturnal dyspnœa, which are common in both instances. The cause of inspiration is the presence of venous blood charged with carbonic acid, in the respiratory centre in the medulla; in deep sleep, in disease of the respiratory organs, sometimes the breathing falls so low that the blood is surcharged with carbonic acid gas; then when a certain point is reached the centre is roused up to violent respiratory efforts —an attack of dyspnœa; after the blood is so freed from the excess of carbonic acid, the breathing quiets down, and the patient falls asleep readily. But when the right ventricle is over-distended the dyspnœa is not so readily relieved, and the attack continues for some time.' This is an important distinction to make in practice, diagnostically; and also as to its indications for treatment. The dyspnœa from failure in the respiratory centre calls for the stimulants to that centre, as strychnia; the over-distension of the right ventricle for digitalis, and agents of allied action.

In discussing the utility of strychnia as a potent stimulant to the respiratory centre in my Fothergillian Prize Essay, 'The Antagonism of Therapeutic Agents; and What it Teaches,' I allude to these attacks of nocturnal dyspnœa; and give three cases where the attacks were encouraged, if the word may be used, or fostered by the habit of taking narcotics. All were the subjects of chronic bronchitis; one was in a typical gouty man, many of whose joints were crippled by gout; one was 'chronic bronchitis with emphysema,' without

any word of gout; the third 'was the subject of lithiasis, had corded arteries, a hypertrophied heart, with irregular action, chronic bronchitis blended with emphysema and great vesical irritability.' The two first were cured, in the strict sense of the word, of their nocturnal dyspnœa by strychnia; in the third case the strychnia increased the vesical irritability so much that belladonna had to be substituted for it, with satisfactory results. In all the effects of treatment were obvious. These three cases were selected because there was the complication of a narcotic added to the lithæmia as a cause of the depression of the respiratory centre. Uncomplicated cases are numerous enough. Dr. Basham speaks of attacks of inexplicable dyspnœa in the course of dropsy of renal origin; and it was this observation which first directed my attention to the subject. It is indeed important to distinguish betwixt the attack of nocturnal dyspnœa due to temporary failure of the respiratory centre, relieved by some deep breathing restoring the blood to a normal state; and the attack of cardiac asthma due to over-distension of the right ventricle. The latter is a longer and more serious affair altogether. The association of these attacks of respiratory failure with lithiasis is unquestionable; but the why and how have yet to be discovered. The treatment of them by resort to a respiratory stimulant is, however, satisfactory.

Gouty bronchitis is found mainly with the catarrhal and emphysematous types; and the lithæmic factor is important in the treatment of the cases. Especially if there be also present an hypertrophied heart with corded arteries, and a large bulk of pale urine. In all such cases the patient almost invariably gets up during the course of the night to make water. This is a symptom whose significance is great, as it is associated with the presence of the gouty, or cirrhotic kidney. In many of these cases, opinion might vary in the case according to the bias of the medical man. One might put it thus: 'Chronic bronchitis, with a gouty condition;' another,

'Chronic Bright's disease, complicated with bronchitis;' while a third might say, 'Gouty heart and arteries, with bronchitis:' and yet each be right in his view. To the laity, unfamiliar with complex pathological conditions, such difference of expression might, and probably would, indicate great difference of opinion; nor is it difficult to conceive such result to be very probable. It is well then, in speaking of such cases to patients and their friends, to point out the fact of a complex malady which might be variously described according to the point of view from which it is surveyed. Many cases of 'different opinions' melt into 'different aspects of the case,' when carefully examined.

Now these remarks lead up to another matter, viz., a chapter on 'prognosis.' Such a chapter could be written, doubtless; but whether it is desirable to write it is another matter. I think the description given here will enable the reader to classify his cases, and then to see for himself the indications for a prognosis in each; and so be of more real value to him than any attempt to formulate rules of thumb. Broad statements might be made, such as—'habit often creates tolerance,' in speaking of an enlarged right heart, and a diaphragm inured to dyspnœa; or—'tissue-decay is often revealed by the fatal effect of a slight bronchitis,' in alluding to degenerative forms; or, again—'bronchitis is always a severe test where organic disease already exists:' these and other truisms could be grouped to look very well on paper. But whether they would stand the test of the sick-room, is another question. Bronchitis is always a serious matter at either extreme of life, and to those whose powers are undermined by pre-existing disease, or confirmed debility. In such persons the prognosis is always grave. Acute exacerbations implanted on chronic bronchitis also always carry with them valid grounds for anxiety. Hence it is well to be guarded about acute conditions supervening, no matter of what kind, in the course of chronic bronchitis. As to the bronchitis itself, each case

must carry with it its own significance. And the only way to estimate this is by reading the individual case in the light of a good well-thought-over knowledge of the subject generally; and with each factor and unit of the case carefully noted and appraised. Much, sometimes almost everything, will depend upon the skill with which the medical man wields his remedial agents; his presence of mind, and capacity to see danger ahead, and how to change his front to meet it. Latham wrote in language which entails no misconception as to his meaning, 'The treatment of diseases rightly considered is in fact a part of their pathology;' and this is especially true of the complications of chronic bronchitis which threaten life rather than the bronchial condition itself. When the breathing mounts in rapidity, or a dusky hue steals over the countenance, the significance thereof cannot be overrated; they are the heralds of coming change: and the medical man must be up and doing what he can, and get all his reserves of knowledge to the front speedily; else the battle will go against him, and the patient pass away into the unknown land. Definite knowledge, a wide range of resource, are imperative; if not at hand, the urgency of the case leaving no time for their acquirement, the issue is soon determined. A clear head as to what should be done, and the moral courage to act promptly and energetically in emergencies, are equally desirable. The medical man who hesitates in emergencies loses his patients! He is like a military leader; he should be able to plan a campaign, and fight a battle, both, to be successful in his contests with chronic bronchitis and its intercurrent acute complications. Hence much of the prognosis lies with the doctor, and does not rest with the patient. True it is that the courage and endurance of the patient often lead to results which without them could never be attained by even the most skilful and heroic measures. If such mental attitude be linked with great physical power, and a good family history, then the patient will outlive the storm, when the prospect is dark as

midnight, or, to use a simile which has done service before, 'as dark as the oncome of night in a freshening south-western rain-storm.' Patient and doctor, each are factors in the prognosis. Courage is requisite in each; in the one to act, in the other to bear. The patient's constitution may have been undermined by his past excesses, and so the case collapse without such result being indicated; or the doctor may not be thoroughly master of the situation, and fail to do the right thing, or perhaps even lose his head, and actually adopt a wrong measure, and all is quickly over.

How then is it possible to write any rules for calculating the factors of prognosis under such circumstances? A thorough understanding of the subject, alike the individual and the disease, alone will endow the medical man with the power to construct a forecast which time will verify. The subject must be 'read, marked, learned, and inwardly digested,' and this last is a very important matter, for this end; and if the present essay helps its readers thereto, it will not have been written in vain.

What should be done to achieve a successful result the writer will attempt to delineate, in broad outlines, in the next and concluding chapter.

CONCLUDING CHAPTER.

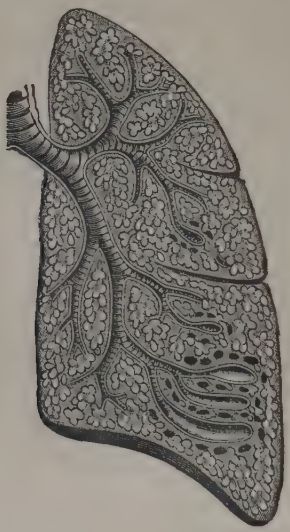
THE TREATMENT OF CHRONIC BRONCHITIS AND ITS COMPLICATIONS.

THE first thing to be done in the treatment of chronic bronchitis is to teach the patient how to cough. Yes, how to cough!

This may seem, on first sight, intensely absurd. I admit I have seen an incredulous smile, which had an element of scorn in it, pass over the features of patients when being instructed how to cough. It did not seem necessary to be taught how to do a thing which had been practised for years. But when they put the matter to the actual test of coughing on the principle laid down, their mental attitude became reverent and grateful. They soon found that coughing is not a matter of instinct. A cough may be a convulsive expiratory effort, provoked by some irritation which excites it reflexly; but it is a complex movement which is greatly under the control of the will. Victor Hugo says a French prisoner, when attempting to escape, never coughs. He, in his terrible strait, can inhibit coughing altogether. This involves heroic resolution; but to so conduct the act of coughing as to secure its maximum utility, only involves an intelligible explanation and a rational consideration thereof. The accompanying engraving will help to illustrate what is being written. In order to compress the thickened lung-wall around these dilated tubes, and thus expel the contents of the bronchial lacunæ, considerable elastic pressure is necessary. And a sufficient elastic pressure cannot

be brought to bear thereupon unless the chest be well filled with air before the expiratory effort is made. Learn to fill the chest with air before commencing to cough; that is the lesson sought to be conveyed here.

Many persons give way to the impulse to cough without previously filling the lungs, and then protracted and useless cough follows. They grow black in the face, they struggle, and when they have recovered their breath, tell you they went blind; and yet the result is unsatisfactory; unsatis-



factory because, despite their violent and sustained expiratory efforts, the lungs were not sufficiently distended by air to secure the requisite pressure on the dense walls of the dilated tubes.

When the effort goes on till vomiting is provoked, then the peccant matter is ejected; but this involves a very severe strain, ill borne by persons advanced in years. It is all very well to administer an emetic to a child to clear its obstructed air-tubes; and though it looks, during the operation, as if it would choke there and then, the procedure is harmless. But

as years roll on the strain becomes less harmless, till ultimately it is fraught with danger. It is very undesirable that coughing should pass on to vomiting; and to avoid this the patient must be instructed how to cough properly, and on rational principles. To fix the shoulders first, if necessary or practicable; then to fill the thorax with air; and after that to permit the expiratory impulse to proceed. A little practice will soon convince the patient of the soundness of the plan, as tested by experience.

If a small muscular fibril has been torn from its attachment by violent cough, then acute and severe pain is induced in each act of cough. So severe is this, that the patient may scream out. The pain is local—can be covered by the thumb-end indeed—and is usually at the attachment of the abdominal muscles to the ribs in front, or the quadratus lumborum. In time the patient learns to adopt an attitude which lessens the strain upon the growing reattachment, and with that the accompanying pain. As it takes the individual some time to acquire this trick for himself, it is well to teach it systematically, as much suffering is saved thereby. Sometimes it is well to place the closed fist over the spot, or to hold the hand over it tightly, by which the strain is further lessened.

So much, then, for teaching the patient how to cough; so as to cough as efficiently as possible, with the maximum of effect, and the minimum of suffering.

Then there is another matter connected therewith which may be mentioned here; and that is the cough provoked by getting into a cold bed. We all know that cough, or deep breathing, or both, are set up by getting into bed in very cold weather. The contact of the cold bedclothes excites it. The explanation which has been tendered is this—the contact of the cold clothes chills the blood in the cutaneous vessels, and this chilled blood when it reaches the lungs sets up cough, acting as an irritant. Whether this is the whole explanation or not, it is a part; and can be made useful in telling us how

to avoid such cough, at once painful and useless; for that chilled blood cannot be get rid of by cough. The night-shirt, or gown, should be warmed on being donned; and the bed warmed too. If not too irritant to the skin it would be well if the night garment consist of flannel, and also that the patient sleep in blankets. This, however, is a practice not approved of by many housewives, who say it is dirty. At times it is well to adopt the plan, notwithstanding its alleged uncleanliness. My late father was an example in this respect of what should not be. He got warm by the fire and had an alcoholic night-cap (as well as a cotton one with a tassel); so far so good. But then he went into a cold bedroom, stripped off his warm day-clothes, put on a cold night-shirt, said his prayers; and lastly got into a cold bed with sheets—and coughed. This practice did not improve his winter bronchitis. Nor did the habit become altered by experience. It is well to attend to these points: and further, not to go from a warm day-room into a cold bedroom, but rather to air the room with a fire; throwing back the bedclothes so that they may become aired, if the bed-warmer be not among the household gods! It is well to take some hot fluid, alcoholic or other, while getting into bed, taking the last portion when actually in bed. A treacle-posset, with or without some rum in it, is the time-honoured measure for this end; and an excellent one it is. Others prefer some mulled wine; some hot spirits and water; or some hot milk, with or without malt-extract in it; or some hot beef-tea, either fresh or made from Liebig's extract. Remember bronchitic patients are a chilly race, and must be managed accordingly. By attention to these seemingly little matters much avoidable discomfort may be prevented.

The same principle holds good about dressing. The clothes should be made warm, and donned with as little exposure to cold as is possible. Especially is this desirable when the undershirt has to be changed. Also the patient should be saved all possible exertion thereupon; and the warm underclothing should be accompanied by a deft-handed at-

tendant, who can swiftly and skilfully take off the old and put on the clean, without disturbing the patient much. It is well, too, to have a good fire in the room for an hour or two, so as to thoroughly warm it, before the changing takes place. These instructions as to what to some may seem minutiæ, are very important, because they bear on everyday matters, and in doing so affect the patient perpetually; favourably if attended to, unfavourably if neglected or ignored.

The clothes of these chilly beings should be warm but light. Their embarrassed respiration cannot bear the weight of heavy clothes. Consequently an eider-down quilt for the night is most desirable. If the patient is in the habit of throwing off the bedclothes during the night when but partially awake, and dropping off to sleep when so uncovered, and consequently of catching cold; it is well to insist on several thicknesses of flannel being sewn together, about the size of a pillow-slip, with tapes attached to the free edges so that it can be tied in front, to put round the chest at nights. This is very useful when there is any acute trouble; and by having two, one can be warmed ready to put on when the other is taken off, and this furnishes the same good service (of the application of external heat) as a poultice; or a chest-protector, with spaces for the arms, might be adopted.

Then as to the day-clothes; 'light and warm, one good undershirt is worth a great-coat,' says an old proverb. It is as warm and immeasurably lighter. See, then, to the woollen underclothing. Or the patient may wear a guernsey or Cardigan jacket with advantage. If the liver be exposed by protruding beyond the ribs, it is well for the patient to wear a broad flannel belt, or even a sealskin waistcoat. The sufferers from chronic bronchitis cannot take sufficient exercise, when out, to keep the body warm; and are too scant of breath to endure the weight of heavy clothes. It is well, then, to bear this in mind as to their habiliments. Light enough to be borne; warm enough to keep them from catching cold

Boots of good stout leather, big enough to admit of a cork

sole; and socks, or stockings, of Scotch fingering wool, or fleecy hosiery. Lambs-wool night-socks may be desirable where the feet are cold. (Cold feet are a great source of sleeplessness. They should be rubbed till they glow when the patient gets into bed, and then the night-socks put on. After these measures a hot bottle in bed is decidedly advantageous.) Where there are draughts under the doors warm cloth or felt slippers, or even cloth button-boots, are indicated. The most minute and scrupulous watchfulness as to changes of weather and temperature, both on the part of the patient and the patient's nurses and attendants, is desirable. Remembering even that the nights are colder than the days, and that the clothing must be regulated accordingly.

Another matter there is worth attending to with these imperfectly aërating folks, and it refers to the practice of taking something warm on going out. This is a common practice. If the 'something' is alcoholic it is injurious; as the alcohol dilates the vessels of the skin and increases the heat-loss when out, and they have no body-heat to spare. Let it be a warm fluid milk, with tea or coffee or cocoa, or may be treacle—for the heat of the fluid is useful—or a drink of beef-tea or mutton-broth with some condiment in it. That is the form of 'something' to go out upon.

But when the excursion is over and the patient regains the house, then the practice is different. Alcoholic drinks are then serviceable; they dilate the arterioles, and so equalise the blood distribution, which may have been disturbed by the exposure out of doors. Many a chill would pass away without troublesome consequences by such a regimen, which causes much disquietude. The fluids mentioned as 'night-caps' are suitable for this purpose. Often it is well to permit the patient to have a nap, when the dilated bloodvessels leave the brain anæmic, and the tendency to sleep is pronounced.

Another matter is not unimportant with these chilly beings, and that is a respirator. This not only prevents cold air blowing into the mouth and down the throat when the mouth

is opened, either for speech or breath, a matter of some moment; but the warm expired air heats the metal of the respirator as it passes out, and that, in turn, raises the temperature of the inspired air, so that so much heat that would otherwise be wasted is utilised. When the respirator is not worn the inspired air has to be heated by the Schneiderian membrane, and so much body-heat taken for the purpose. The use of a respirator saves the waste. Another matter is this: The patient is exceedingly apt to catch cold by exposure on getting out of bed for natural purposes. It is desirable that the patient have a large roomy dressing-gown, well quilted with liberal quantities of cotton, to put on when getting out of bed. The chronic bronchitic is apt to tarry on the night-stool, for expulsive efforts are trying and fitful with them, and so to catch cold. Hence the necessity for attention to the matter. Cold water-closets are hazardous to them, and outdoor privies still more fraught with danger. One good patient I lost from going out of the hall-door to make water after dinner. He was at a dinner-party, and went from the hot dining-room abruptly into the cold; for his bladder was irritable, and the call to empty it, when it came, was sharply imperative. He gave way to the impulse, and the sands of life ran quickly out as the outcome thereof.

Now it will be well to consider the medicinal treatment of bronchitis, and in order to make it strictly rational it is desirable to briefly review the pathology of a bronchial attack.

At first the mucous membrane is swollen, and turgescent with blood, while the secretion is scanty and viscid. Later on the secretion is more profuse, while the mucous membrane thins down to its normal condition; and the patient gets quite well. In chronic bronchitis the acute attack is not quite recovered from, and a residuum remains: the bronchial membrane remains thickened with an unduly profuse secretion.

Now there are two classes of medicaments required according to the stage; one such as will relieve the congested mucous membrane and excite secretion, by which we hasten

the first stage; and the other the expectorant proper, which acts upon the nervous centre that governs the muscles of respiration. Wood classes them, 'nauseating expectorants' and 'stimulating expectorants.'

Nauseating is scarcely the exact word to use, and yet it is difficult to find a better definition. As it happens, two of the most important and useful remedies for the relief of the swollen mucous membrane are both powerful nauseants and emetics according to the dose given. These are ipecacuan and tartar emetic. The first stimulant, and the latter powerfully depressant. The first adapted to delicate persons; the latter better suited to the robust. I should prefer the term 'relaxant' to 'nauseating,' and class them as: (1) Relaxant expectorants; and (2) stimulant expectorants.

In the first class stand tartar emetic, aconite, iodide of potassium, and acetate of ammonia, as typical agents: while ipecacuan can stand in both categories, that is, it acts upon the mucous membrane and the respiratory centre both; consequently it is admirably suited for the early stage of bronchitis in children and delicate adults.

A pure relaxant expectorant is an expectorant only in so far that its action upon the mucous membrane, and its secretion, is to modify the secretion so that it can the more easily be expectorated. But it exercises no influence upon the act of expectoration. When the mucous membrane is swollen, turgid with blood, and dry from insufficient secretion to keep it moist, the agent to alter this condition is one which relaxes the bloodvessels; in other words, a 'depressant of the circulation.' Such agents dilate the bloodvessels generally throughout the body; the vessels of the mucous membrane being already dilated. The effect of this is to bleed the patient into his own vessels, and so to deplete the turgid bronchial membrane. The skin becomes bedewed with moisture, and along with this the bronchial membrane becomes moist. This gives relief from the irritation, with useless cough, of a

dry mucous membrane. For such end it is well to give the tincture of aconite in drop doses every hour, as recommended by Ringer; or to give five-drop doses every three or four hours. But there is somewhat of risk about depressants, which sometimes, without any discernible reason, act with abnormal potency. Consequently their use is to be largely restricted to cases immediately under supervision at short intervals.

Tartar emetic is a depressant of the circulation acting like aconite. This is a good useful prescription:

Vini antimonialis - - - - ℥xv.
Liq. amm. acetat. - - - - ʒj.
4tâ quâ que horâ,

in fairly robust persons. Or five drops of the tincture of aconite may be substituted where the antimony distinctly disagrees. When the pulse does not indicate a vascular depressant, then it is well to prescribe the iodide of potassium with the spirits of Mindererus, as follows:

Potass. iodidi - - - - gr. v.
Liq. amm. acetat. - - - - ʒj.
4tâ quâ que horâ,

which is a capital combination. When there is great feeling of soreness or 'rawness' down the sternum, it is well to use some liniment, as croton-oil, for instance, over the chest, as a counter-irritant. Or mustard may be dusted over the surface of the linseed-meal poultices, which should be constantly applied. This often enables the internal medicine to act efficiently; when not doing so without such help. Or fifteen drops of ipecacuan wine may be given instead of the iodide of potassium if the pulse be feeble.

The first step is to induce relaxation of the swollen bronchial mucous membrane with free secretion of mucus. When this has been accomplished, then a step forward can be

taken, and stimulating expectorants may be adopted. A great many of my professional brethren have been tickled by my account of what my father used to say about the use of squills. 'Whenever the bottle of syrup of squills appeared instead of the ipecacuan wine: "Never give squill until the skin is moist and the phlegm is loose—it will do no good; you must give ipecacuan and relaxant expectorants as long as the skin is dry and the phlegm tough: squill is very useful in its place, and will be all right in a day or two," was the phrase which greeted my youthful ear, much to my benefit.' (Practitioner's 'Handbook of Treatment,' p. 364, 2nd edition). Such, then, is practically the difference in time of the use of relaxant and stimulating expectorants. Sometimes it may be necessary to bleed a patient before the relaxant remedies can become operative; but this must be a rare occurrence.

Very frequently it is well to put the patient into a warm bath, in order to hasten the first stage, or to reduce the necessity for the depressant relaxants, or to diminish the dose required; or Sir James Simpson's bath is often very convenient, especially in the homes of the poor, where simplicity and economy are essential. 'It consists of the simple apparatus of six or eight soda-water bottles, as many woollen stockings, and some hot water and corks. Each bottle is filled with hot water, and tightly corked. Then a stocking is wrung out of hot water, so as to be moist, but not dripping, and drawn over the bottle (as it is over the foot when put on); each bottle, so encased in the moist stocking, is put into bed, and the whole are placed around the feverish patient. So packed round the sides, and betwixt the legs, etc., each bottle steams away, the moisture of the stocking making the air damp. In from twenty to thirty minutes a thoroughly free perspiration is in full swing, and thirty-five minutes are usually enough for one bath—at least with most persons. If the patient be then wrapped up in a blanket and covered up for thirty or forty minutes more, the diaphoresis is kept up; and then the patient may be unwrapped

and left in bed, with his skin moist and bedewed with perspiration. If the bed be improperly wet, the patient may be removed into another bed which has been previously thoroughly well-aired and warmed. If only one bed be available, the patient must be enclosed, along with his bottles, in a large blanket, which can be removed, leaving him in bed after the bath is over. Combined with iodide of potassium and acetate of ammonia, this bath forms a capital treatment for the first stages of a simple pyrexia; it is at once efficient and safe' (*op. cit.*). For a person who is already the subject of morbid change, and where the resort to depressants is more than ordinarily hazardous, such a plan of combined external and internal measures has much to recommend it; and it will be found eminently satisfactory in a troublesome kind of case.

At other times the new mischief is but slight, and it is only requisite to give relaxant remedies at night, continuing the day medicines, if such have been previously taken. It is well often to give the old-fashioned powder, calomel grs. iii. with pulvis Jacobi, or pulv. antimonialis grs. v. at bedtime, with or without a grain of pulv. opii; or sometimes five grains of Plummer's pill. In the morning a purgative draught, containing some mineral saline, or black-draught, or the bitter water of Frederickshall, may be given; but purgation, with its consequent exposure and liability to fresh cold, is to be avoided.

Such, then, are the relaxant and diaphoretic measures to be used for the first stage of a swollen vascular, turgid mucous membrane, with diminished secretion.

Stimulating Expectorants.—These in their turn are highly useful. They act directly upon the respiratory centre in the medulla oblongata. The presence of carbonic acid in the blood is the stimulus to this discharging motor centre to send out its rhythmic currents. These outgoing currents set up contractions of the respiratory muscles with the chemical interchanges so brought about, viz., the giving off carbonic acid and the taking in of oxygen; and by constant communi-

cations, or telegraphy back-and-forwards, the blood is kept of normal character. When oxygenation is good, the breathing is slow and tranquil ; when the proportion of carbonic acid increases, then the respiration is hurried and laboured. As the respirations rise in frequency, so does the gravity of the case mount. Irritability is the precursor of exhaustion in nervous centres ; and with the rhythmically discharging centres which preside over the respiration and the circulation, a rise in rapidity is of bad prognostic omen. When these centres are becoming utterly exhausted their actions may alter and the motor discharge be slow and laboured. The patient may gasp for breath, or the heart may beat very slowly. When either of these events comes to pass, we recognise that life is fast ebbing away. The chemical interchanges in the lungs and in the capillaries are insufficient to maintain the body temperature ; and as this falls, the two vital centres become further embarrassed. The chilly hand of death is being laid upon them ; the cold palsies them, and the patient dies.

Death takes place from failure of the respiratory centre ; accompanied, or followed, by arrest of the heart's action. This is the view upon which the wary physician keeps a steady eye, ever wakeful and watchful. This is the side from which death will approach ; and this avenue must ever be borne in mind. The patient is utterly worn out and exhausted by want of sleep, begs piteously for a narcotic, just for a little sleep. A sleeping-draught of opium, or chloral, or both, is benevolently given, the patient falls into a deep sleep—but unfortunately never comes out of it again. These drugs act first upon the higher centres of the hemispheres, and consciousness is abolished, that is the first effect ; and the abolition of consciousness, though harmless itself, is an indication of what is going on. Gradually the palsying effect is felt by the wearied basal centres, exhausted by their long struggle, and they go to sleep too ; and then the patient dies. The blood could only be kept clear of carbonic acid by the most strenuous

voluntary efforts; without these the centre would completely fail to attain this end. Abolish them and the respiration ceases. Relieve the patient from the necessity of those terrible voluntary efforts, and he would sleep soundly enough without a narcotic; as Damian slept in the intervals of the rack. If this could be done, natural sleep would follow.

Now there is only one way of attaining this eminently desirable end, and that is by whipping or flogging on the respiratory centres by direct stimulants thereto. It is like flogging the horses of a Russian sleigh when pursued by wolves. So it is with the respiratory centre. It must be flogged too, and with no doubtful lash. The respiratory centre will bear a great deal. The old Spanish Inquisitors knew that. To torture a man to death by embarrassing his respiration was a slow and intensely painful mode of death. A whiff of air, for a minute or so, would restore the centre sufficiently to ensure another long spell of agony. They knew that well enough. So it is in disease. The respiratory centre is not easily exhausted. What gave devilish satisfaction to the Inquisitor, is a source of great comfort to us, in our struggle with death, when the respiration is embarrassed. The power of endurance of the respiratory centre is great—almost illimitably great; if there be no complication co-existing to sink the powers. It will respond, too, to other stimuli than carbonic acid; and when becoming exhausted or wearied with its efforts, other and potent stimuli are indicated. If these be given, then the respiration becomes slower, and is less dependent upon voluntary auxiliary efforts; and consequently the patient can sleep with comparative comfort. For instance, while this chapter has been awaiting completion, I was called into Montgomeryshire to see a patient believed to be sinking. He was nearly sixty, had a slight mitral contraction, some congestion of the base of the right lung (with bloody expectoration); and had œdema of the legs, much albuminuria, and very scanty urine. Digitalis given alone disagreed with him.

On the combination of strychnia with digitalis (strychnia as a direct stimulant to the respiration, and digitalis for the right ventricle), in forty-eight hours the respiration had fallen from 58 per minute to 36; and in sleep even to 22. This made an immensity of difference to the patient; from breathing for life it meant a condition compatible with natural sleep. The improvement was seen in the impression on the respiration and the circulation, each approaching their normal condition;* while the dropsy fell, the urine increased in bulk (from half a pint to one and a half pint), and the albuminuria totally passed away. The œdema and the albumen were both resultant outcomes of the obstruction in the pulmonic circulation. This is a very instructive case, and the patient, himself a medical man, watched the changes so brought about with a professional interest, greatly enhanced by the improvement in his subjective sensations. Indeed, the combination acted like a charm. Instead of being awakened from a fitful sleep and gasping for breath (and in doing so throwing off the bedclothes and catching cold), he could sleep without the accumulation of carbonic acid rousing the respiratory centre to violent efforts, involving all the accessory muscles of respiration, to get rid of it. The centre under the new stimulus could perform its work efficiently without those attacks of dyspnœa described at p. 100, so common when defective kidneys allow the blood to become surcharged with nitrogenised waste. A stimulus to the wearied (and poisoned) respiratory centre does away, to a very great extent, with the necessity for voluntary efforts or paroxysms of violent breathing.

Now what are the stimuli to this centre with which we are acquainted? For with the enlargement of our pathological knowledge comes precision as to what we require. Instead of

* One would not say 'strychnine slows the respiration,' or 'digitalis slows the circulation;' the slowing is a part of the improvement—the improvement does not rest on the slowing.

groping about the comparative night of empirical lore, we now see by the light of daybreak what it is we desire. Physiological exploration as to the action of drugs has come to the aid of clinical observation; while more precise prescribing has led to closer clinical observation: and, as the result of all this, we now know pretty clearly what it is we want to achieve when the respiratory centre is being overwhelmed by demands upon it. What we want are direct stimulants to the respiratory centre: and such agents we find in ammonia, strychnia, and belladonna, certainly; in squill, which acts also upon the heart; and in senega, serpentaria, ammonia, and benzoin—these last not having been scientifically investigated, and their claims resting upon clinical observation only. Nevertheless they are time-honoured remedies which have done good service.

Ammonia is a powerful stimulant to the respiration, and, as carbonate of ammonia, is very useful when the secretion is blocking the bronchial tubes, and the patient feels as if about to choke. As chloride of ammonium it is useful in less acute conditions, especially in chronic bronchitis, accompanied by rheumatic pains. In consequence of this action of ammonia, it is the ammonium bromide which is indicated, when a narcotic is required in cases of respiratory embarrassment.

Belladonna is also a well-known stimulant to the respiratory centre, as well as to the cardiac ganglia. The following is a capital combination of ammonia and belladonna, much liked by many patients:

Liq. atropiæ sulphat. - - -	℥i.—ii.
Liq. amm. anisatus - - -	℥xv.—xx.
Aq. ʒi. ter in die.	

(The liquor ammoniæ anisatus is taken from the Prussian Pharmacopœia, and is prepared by adding oleum anisi ʒiii., liquor ammoniæ fortissimus ʒiii., to sp. vini. rectif. ʒxii.) Such

mixture is potent in action, and agreeable to take; the carminative suiting the flatulent chronic bronchitic capitally. In all cases where there is much irritability about the bladder (a common condition in elderly men) this is the mixture to be prescribed *par excellence;* as the atropia soothes the bladder centres. (Strychnia makes them more irritable, and therefore is contra-indicated where there is much vesical irritability.)

In using belladonna it is, in my experience, utterly useless to follow the pupil as a guide to the use of the drug. Pupil dilatation, dryness of throat, and dimness of vision; these are the trio of indications that the belladonna is making itself felt. Not to be ignored certainly; but equally certainly not to be made the bugbears (I use the offensive expression deliberately) they have been. They are the outer danger-signals only, and may be passed by a long way before anything serious be apprehended. Let me be clear about this expression of opinion. While I say distinctly that belladonna—when otherwise doing good—need never be stopped for any or all of these semeia, I do not desire to encourage recklessness in the use of potent remedial agents. While reprobating the want of moral courage which would, without carefully weighing each factor in the case, stop the drug because these indications of physiological action manifest themselves, calling them 'toxic symptoms;' I desire no neglect of their significance—they tell that the action of the drug must be carefully watched; not necessarily that it be withdrawn. Of the use of belladonna to antagonise the effect of morphia upon the circulation and the respiration, when narcotic night medicines are indicated, something will be said further on (p. 128).

Another most potent stimulant to the respiration is strychnia. Its use in chronic bronchitis extends back now for a good many years. Its action as a direct stimulant to the respiratory centre, as differentiated from its action as a mere tonic, rests upon the physiological experiments of Prokop

Rokitanski, and my own labours, given in my Report to the British Medical Association for Experiments on the Antagonism of Agents affecting the Circulation (1875-6), and my Fothergillian Prize Essay on 'The Antagonism of Therapeutic Agents, and what it Teaches,' 1878 ; to which the reader, interested in the subject, can refer for further information. It was found that strychnia was a direct stimulant to the respiratory centre by Rokitanski. Acting upon this, I found strychnia to antagonise successfully the lethal effects of aconite upon both the respiration and the circulation ; while digitalis did not interfere to any perceptible extent with its action upon the respiration, being a purely cardiac stimulant.

Proceeding from this to its systematic use in embarrassed respiration, the clinical results were most satisfactory; so much so that I read a paper on 'The Utility of Strychnia as an Expectorant,' before the International Medical Congress last year, when my views were supported by Dr. T. Lauder Brunton, Dr. H. C. Wood, and others. I said, 'In acute bronchitis, when the act of expectoration is difficult, it is useful. In chronic bronchitis and emphysema it relieves the labouring respiration ; and when the right ventricle is dilated, adds to the efficacy of digitalis, most usefully' (extract from published abstract). The ordinary prescription for chronic bronchitis, especially with emphysema, in use with me at the Victoria Park Chest Hospital is :

Amm. carb. - - - -	gr. v.
Tinct. nucis vom. - - - -	♏x.
Tinct. scillæ - - - - -	ʒß
Inf. serpentariæ - - - -	ʒj.

Ter in die,

and a very serviceable mixture it is ; the patients rarely asking to have it changed, except when the action of the strychnia upon the bladder is intolerable. When there are also evidences of the right ventricle being overtaxed, ten drops of

tincture of digitalis are added, and the combination is very satisfactory. But I do not stop at these doses; severe disease and consequent suffering demand and justify heroic measures. Certainly I should push strychnia till the limbs twitched, going up to one-tenth of a grain every five or six hours—or further, if necessary!

As an ordinary tonic well-adapted to cases of chronic bronchitis, Fellow's Syrup of the Hypophosphites, containing strychnia, is admirable; the phosphorus being useful in nervous exhaustion.

Such are the three most potent stimulants of the respiratory centre with which we are, at present, acquainted.

Squill is a remedy of old standing and time-honoured reputation as 'one of the most used and most efficient of the stimulating expectorants, coming especially into play in the advanced stages of ordinary bronchitis.' (H. C. Wood.) The most elegant and palatable cough-mixture ever prescribed is as follows:

Syr. scillæ - - - - -	ʒj.
Acid. hydrobrom. - - -	ʒß.
Sp. chloroform. - - - -	ʒß.
Aq. - - - - - -	ʒj.

It is also potent. The squill is expectorant; while the hydrobromic acid acts as a sedative to the irritable bronchial membrane. Syrup of squills being acid is incompatible with alkalies; when these are also indicated the tincture is the form to prescribe. Squill is also a diuretic by its action upon the circulation, which resembles that of digitalis. Consequently it is largely used when there is chronic bronchitis accompanied by dropsy; and an increased bulk of urine is the evidence of its agreeing with the patient. It is well to give it in combination with other expectorants. The above prescription, substituting phosphoric acid for the hydrobromic, is a tonic

expectorant indicated in subacute cases, which will be found to give satisfactory results.

Senega is a remedy much in use as an expectorant, especially in combination with carbonate of ammonia. The mixture is unfortunately a very nauseous one, and only the fear of death can induce patients to continue it. It is a great improvement, however, to add some spirits of chloroform to the mixture. 'Senega is chiefly used,' says H. C. Wood, 'as a stimulant to the mucous membrane of the lungs in chronic bronchitis, and in the very advanced stages of the acute disorder. It is believed to be one of the most stimulant substances of its class, and is therefore contra-indicated by acute pulmonary inflammation, and is indicated by a relaxed state of the bronchial mucous membrane.' I follow Wood here, as my own experience of senega dates back a number of years; my patients rebelling against it strenuously. One thing I well remember, and that is never to shake a bottle containing senega: if this is done the most persisting froth follows. Senega is indicated in chronic conditions, or subacute ones, where it is useful, especially with the chloride of ammonium; provided the patient can be induced to take it.

For some years past I have been inclined to substitute serpentaria in cases where senega would ordinarily suggest itself. It is a pleasant stimulant tonic, and forms a good vehicle for the more decided expectorants.

Ammoniac used to be described as a 'raking' expectorant, indicated in serious conditions. It is now falling into disrepute, and disuetude is following thereupon.

Benzoin also is going out of fashion, except as a local application to the bronchial mucous membrane in the form of spray. It seems especially indicated when the uric acid is formed in excess in the system, as in gouty bronchitis.

Beyond these agents there are the balsams, especially of tolu and of Peru. They are said to exercise a soothing and restorative influence over the bronchial mucous membrane

when chronically diseased; in much the same way that copaiba acts upon the urethral mucous membrane. Given with the iodide and bicarbonate of potash, these balsamic expectorants are often serviceable in gouty bronchitis.

Such, then, is the list of agents at our command for the internal medication of sufferers from chronic bronchitis.

There are also certain measures of local application which can be used with advantage at the various stages of the malady. First of these stands steam itself. An ordinary kettle may be made to steam freely so as to affect the atmosphere of the patient's room; or buckets of boiling water may be taken into it, and frequently changed. Then a steam-kettle may be used to steam the bronchial membrane by inhalation. As a resolvent, in the first stage of turgid dry bronchial membrane, such local application of steam is both grateful to the feelings of the patient and useful. For out-patients with viscid scanty secretion of mucus a good plan is to direct them to wring a large sponge, or flannel cloth, out of hot water, and to sprinkle it freely with turpentine or terebine, and inhale the fumes. This is usually very efficacious. For the purposes of spraying, tinct. benzoin. co. is very useful. Dr. Orlebar gives me the following as the results of his experience at Victoria Park Hospital:

'Tincture of benzoin in inhalation in the proportion of one drachm to the pint of water alleviates the cough, and is not without its good effects on the physical signs. (Internally, ten drops in water, or on sugar, are capital in allaying cough.)

'Carbolic acid, ten grains to the pint of water; excellent, having used it in every form of bronchitis, and with invariably good results.

'Turpentine gives excellent results in acute bronchitis when the patient is cyanosed and suffering.'

Then there are hot applications, as poultices, giving the patient a sense of comfort; and acting directly upon the heart, especially the right ventricle, immediately under the thoracic

parietes, when embarrassed. They should embrace the whole chest, as 'the jacket poultice,' in acute conditions. One thing there is about putting on a poultice, as pointed out by Dr. Lauder Brunton, and it is this: If the poultice be put on 'scalding hot,' it does literally scald the patient, and no mistake about it. If it be kept till it be cooled down enough to be borne by the naked skin, much of the heat is lost. The proper plan is, then, to place a fold of flannel over the patient's chest and apply the hot poultice above that. By such means the maximum of good effect is secured. The poultices should be changed swiftly, so as to expose the patient as little as possible. All should be ready to the smallest minutiæ before the patient is disturbed; and then the cold poultice should be removed and the new one applied with as little loss of time and distress to the patient as may be. Dexterity in the manœuvre is only acquired by practice.

At other times it is more convenient to fold three or four thicknesses of flannel to about the size of a pillow-slip, sewing them together, and attaching tapes to the edges. This garment can be placed around the patient, and the tapes tied in front; and is very useful, especially when the patient is inclined to throw off the bedclothes and so to catch cold. If deemed desirable, two can be used alternately, heating them in turn and putting one on when external heat seems indicated. Often a poultice is a good means of applying mustard as a rubefacient. Of course, here the poultice must be applied directly to the skin. Such a measure is indicated in conditions of serious respiratory embarrassment from engorgement.

Then counter-irritants are often serviceable when the cold is 'fixed'—*i.e.*, the first stage is prolonged—and the patient complains of the breast-bone feeling raw, or as if it had been scraped. Then external applications usually give great relief. Tincture of capsicum in camphor liniment, or turpentine liniment; hartshorn liniment, or the stronger ammoniacal liniment, are suitable measures to adopt. Tartar-emetic oint-

ment is now rarely used, and croton-oil liniment has its drawbacks. Croton-oil liniment rubbed well into the chest (℥ℌ every night till the desired effect is produced) until vesication, or rather a crop of papules, is produced, is a capital measure. The itching which follows the eruption continues the counter irritation; and, when this ceases, the liniment may be rubbed in again. Croton-oil liniment is, perhaps, the best of all these measures, as the counter-irritation may be made slight or severe at will, if it were not for this drawback: if by any accident the liniment touches any tender skin like that of the eyelid or scrotum, most disagreeable effects are produced. This is most apt to happen where the patient is compelled to apply the liniment himself, as in the poorer ranks of life. When so engaged, a momentary irritation or itching tempts a scratch, and the hand, covered with croton-oil liniment, is directed to the spot. For a moment only; but the mischief is done. Enormous swelling, with an erysipelatous state of the skin, follows, with much discomfort. Properly warned against any such mischance, the patient may be trusted to use the potent application. Whether applied by the patient or some one else, the hands ought to be well washed in plenty of soap and hot water immediately the rubbing is completed; so that no risk of untoward result may be incurred.

These, then, are the measures to be employed, according to the indications of each case.

Before speaking of the combinations of measures indicated in the various forms, it may be well to survey the subject of narcotics. This is a most important matter. Many a sufferer from thoracic disease has passed to his, or her grave, not so much from the disease as from the medicines prescribed; especially in the benevolent desire to procure the patient a little sleep. The patient would, as a rule, sleep readily enough if the necessity for voluntary effort, the conscious struggle for breath, were only put in abeyance. Relieved from this necessity, the patient would sleep soundly without any narcotic.

The feeling of drowsiness becomes positively painful in time, and the patient piteously begs for a little sleep. A sleeping-draught, or a composing-draught, as it is frequently denominated, is given; and the patient sleeps—to wake no more. In such conditions of serious danger, all narcotics are positively forbidden by the circumstances; are simply lethal, if operative. The patient may survive if the dose be not too large; but the experience does not encourage him to ask for any more sleeping-draughts, for the agony has only been intensified thereby. If the dose be large enough to suspend consciousness, and with it the effort which consciousness alone can maintain, the patient sleeps to awake only in another state of being. But in less imminently dangerous conditions, where sleep is broken by cough, or pain, or both, or there is sleeplessness with restlessness, narcotics, in rational doses, may be indicated.

Something of this kind:

Pulv. opii - - - -	gr. ½—j.
Pulv. ipecacuan. - - -	gr. ¼—½.
Pil. scillæ. co. - - - -	gr. iij.

(or benzoic acid may be substituted for the ipecacuan).

Or:

Pulv. opii - - - -	gr. ½—j.
Pulv. guaiaci - - - -	gr. j.
Pil. scillæ. co. - - - -	gr. ij.

where there is chronic rheumatism; a very common concomitant.

When it becomes necessary to give a larger dose of opium or morphia, then it is well to combine atropia with the narcotic. Atropia does not antagonise the effects of morphia upon the hemispheres, but it does counteract the effects upon the centres of the respiration and the circulation, the avenues by which death approaches; while the effects of belladonna

upon the terminal fibrils of the vagus in the lungs is such as to lessen the sense of irritation; and so the atropia helps the morphia as regards the cough. Consequently,

Morphiæ muriat. - - - -	gr. $\frac{1}{3}$
Atropiæ sulph. - - - -	gr. $\frac{1}{30}$
Mist. camph. - - - -	℥j.

forms a potent yet safe night-draught. For constant use it is well to combine the two first with some aloes and myrrh pill, to prevent the constipating effect of the morphia.

Morphiæ muriat. - - - -	gr. $\frac{1}{3}$
Atropiæ sulph. - - - -	gr. $\frac{1}{30}$
Pil. al. et myrrh - - - -	gr. ij.

is a pill in constant use with me at Victoria Park Hospital; and is as great a favourite with my patients as with myself.

In all cases where there are night-sweats this combination is indicated. In all cases where a dose of morphia sufficient to allay the cough produces the exhausting night-sweats, the addition of atropia is indicated. The results will speak for themselves. My patients at Victoria Park call them 'the sweating pills'; and little reck they about dryness of the throat or dimness of vision if only they can escape the sweats they dread, and with very good reason. Indeed, they are systematically taught to look out for these toxic (?) symptoms as indications that the pills are 'taking hold' of them, as they term it; and hail them with delight, as a rule.

And now a few words about the resort to opium, and worse still, chloral, in maladies where the respiration is embarrassed. Both kill, by first paralysing the respiration, and then the heart. There is danger enough of this untoward result from the disease; there is no need to artificially add to the danger. They should, then, be scrupulously avoided; or, if given at all, it should only be with the most watchful, careful supervision, 'like a cat watching a mouse'—nothing less.

But opium in much smaller doses than these may be murderous. The remarks I am about to make may fall as a strange sound—the accents of an unknown tongue—on the ear of many readers; but their meaning will soon be plain enough on a little reflection. 'Opium destroys the appetite and the assimilation when persistently administered;' that is an axiom with which all or most are familiar; at least, it has a very familiar sound to my ear. All whose experience has been classified into an organised consciousness know the fact. The explanation has recently appeared to me to be pretty much as follows: We cannot give a drug for one of its many effects, and suspend others which are undesirable, unless we block these latter out by suitable combinations, as in the pill given above. One of the actions of opium is to impair the activity of the liver. And this it is which in time works most disastrous results. After the albuminoids of our food have been transmuted from proteids into peptones—*i.e.*, from an insoluble to a soluble condition, so that they can pass through the walls of the intestinal canal—they are turned back into proteids, and dealt with in the liver; elaborated into the albumen of the liquor-sanguinis, or passed into bile-acids or urine-solids. Opium lays its palsying hand upon this huge gland, and interferes with this action upon these albuminoid matters; and in time the system wastes. The heart and diaphragm must be fed—and well-fed if possible—to meet the demand upon them. Opium, from its effects upon the finer processes in the liver, tends to starve them in the hour of trial. Opium, then, produces chronic tissue-starvation, a disaster which should be avoided if possible.

While this chapter has been in hand, a marked illustration of what is just being insisted upon here has come under my notice. A gentleman who suffered from recent valvular disease was sent to one of our most famous health-resorts. He had severe 'heart-cough' (from engorgement of the lungs with blood), for which his medical attendants there gave him

opium. He grew worse, and they pushed the dose. He felt dying, and sent for a medical friend in town to bring him home, 'dead or alive.' This gentleman tells me it seemed much more likely to be the latter than the former. The poor fellow was gasping for breath when put into the invalid-carriage in the train; yet he slept three hours on the way, and awakened up to drink a glass of milk. Escaping from the influence of the deadly narcotic, the respiratory centre could carry on the respiration without the necessity for voluntary effort. He reached home alive, and, what is more, has steadily improved since he got away from the range of the deadly sedative. When I saw him again he was breathing pretty comfortably, and had had a fair night of natural sleep; but his sclerotic was deeply stained with bile, showing the effect of the opiate upon his liver. He rallied admirably: the appetite returned, and the power of assimilation as well, almost without medicines; though in a brief time the disease overcame him.

My experience, indeed, has been dead against opium, in all its forms, in cases of respiratory embarrassment; first, for its effects upon the respiratory centre; and, secondly, from its action upon the liver and the finer assimilative processes. It may be that my experience has been an unfortunate one, or I may be unduly dominated by it; but opiates are fell agents to employ in thoracic disease, in my opinion: that is the long and the short of it! I may be unduly prejudiced against such agents: but 'a man cannot leap from his shadow,' neither can he divest himself of the lessons of his own personal experience; and that experience, in my case, has been, unequivocally, that opium is murderous in disease of the chest. I will willingly admit that there are cases, both of bronchial mischief and palpitation, which have been benefited by small doses of opium, in contradiction to my ordinary experience; but while admitting this, it must also be stated that, for one case so benefited, fifty have suffered more or less seriously—they are but the exceptions to the rule. My experience has been no

doubtful one in this matter. The experience of others may have been more felicitous. The experience of each man must be a guide for him in the future. Mine must not be made to press unduly on the reader; but my frank opinion is that opiates are fraught with danger in all disease above the diaphragm; and that when the respiration is embarrassed every dose of opium is apt to be a milestone on the road which leads to the grave.

Perhaps the reader is rather irritated at this persistent statement of the danger of opiates, and wonders what he may give, if he may neither prescribe opium nor chloral, when the sleep is very broken. Bromide of potassium is contra-indicated on account of the potash being a muscle-poison, depressing the heart and diaphragm too much. Bromide of ammonium is the drug *par-excellence* in embarrassed respiration. Then some tincture of hyoscyamus may be given with it.

Ammon. bromid. - - - -	ʒß.
Tinct. hyoscyami - - - -	ʒß.
Mist. camphor - - - - -	ʒj.

is the night-draught I should recommend to any youthful practitioner when in a dilemma. Then he may, if he chooses, resort to the combinations just given; or to Dover's Powder where the ipecacuan prevents the opium depressing the respiratory centre too much. But when in much doubt, he should trust to the ammonium bromide. At other times the 'narcotic dose' of alcohol is indicated. This is a medicinal dose of alcohol—about two ounces of brandy, or its equivalent—not taken as a stimulant, but for its after-effects as a narcotic. Often such a dose of alcohol achieves the desired end better, and with a minimum of after bad-effect, than any other narcotic agent. It is merely the 'night-cap' a little pronounced.

In other cases the monobromide of camphor may seem preferable, and is a drug making its way.

Some patients tolerate cannabis Indica very well; but the

indications for its use are not known sufficiently for any rule to be formulated.

Extract of Indian hemp, with extract of belladonna, made up with a little ipecacuan-powder into a small pill, seems indicated in cases where there coexists much cerebral depression with chronic bronchitis.

Tincture of hop is a narcotic of doubtful value; and a hop-pillow has been credited with soporific properties, though I can say little on the subject from personal experience.

Such, then, are the remedial agents which form our armamentarium when treating chronic bronchitis and its complications.

It may be well now to see how they can be grouped in practice in the management of the different forms and complications, including acute exacerbations.

The variety sec is a prolonged first stage of vascular congestion of the bronchial mucous membrane. It requires relaxant remedies. The formula (p. 113) of iodide of potassium with acetate of ammonia every six hours, with some calomel, antimony, and opium at bedtime, is indicated here; with counter-irritation over the chest, especially in front, and inhalations of steam with turpentine. Sir James Simpson's bath is often useful. If the skin be persistingly dry, and the cough harassing, then some antimonial-wine (p. 113) may be desirable. Even venesection may be required. The air of the room should be kept warm and moist, night and day.

When it occurs in a person of feeble powers, then depressant remedies are contra-indicated, and ipecacuan-wine with acetate of ammonia will be more suitable. Hot fluids—as beef-tea or mutton-broth, with some baked flour, or hot milk with some alcohol in it—should be given to drink.

And now a word as to when a patient can be made most easily to sweat, a point of considerable practical importance. The morning sleep after 6 a.m. is the best time. A diaphoretic dose at bedtime, and a good draught of hot fluid—weak-tea and some milk will do very well in humble homes—as soon as

any one is up to get it for the patient, will often relax the skin, produce perspiration, and relieve the vascular system generally. If not quite successful, try again next morning. Sir James Simpson's bath can be added with advantage, as described at p. 114; after the bath the patient usually falls off into a refreshing sleep, and awakens feeling much relieved. After this stimulating expectorants are indicated (p. 114).

Such, too, is the management of an intercurrent cold, and prompt measures at first often save much suffering and after-trouble. So soon as the skin is thoroughly bedewed with perspiration, then combinations—as syr. scillæ with an acid (p. 113), or, more powerful but less agreeable, the mixture of ammonia and nux vomica (p. 121)—are indicated. At first merely fluid food, sometimes spoken of disrespectfully as 'slops,' is all that is desirable; but as soon as relaxation has been achieved, milk-puddings, eggs beaten up with sherry, or a light-boiled egg broken up with butter in a hot tea-cup, with some pepper and salt; some good soup, as gravy, hare, or mulligatawny, may be given alternately. The patient must be fed on such food as can be assimilated, in small quantities at a time, and at frequent intervals; for there is usually much demand upon the powers, and the danger of sinking thereunder must never be under-estimated.

The asthmatic form is somewhat different from the sec in its management. There is the same turgescence of the mucous membrane; but over and above that, there is spasm of the bronchial muscular fibres. This latter requires its own special management for its relief. The chief of these are fumes. Nitre-paper—that is, squares of stout paper steeped in a solution of saltpetre—as nitrate of potash is popularly termed—and dried, is burned; and the fumes arising therefrom often give great relief. Then there are cigars, made with the *datura stramonium*, or the *datura tatula;* and to smoke one or more of these often furnishes much comfort, from the relaxation of the muscular fibres so produced. This allows of freer respira-

tion than when the spasm existed, and so relieves the sufferer.

A fuming remedy has recently gained a great reputation from the use made of it in the case of the late Earl of Beaconsfield. Many measures were tried by his physicians, but none relieved him so greatly as an American powder of secret composition, known as 'Himrod's Powder.' Several well-known medical men have assured me that this is also their experience of this agent—viz., that it gives more relief than anything they have ever tried. So far as is known, it seems to contain saltpetre, datura, and belladonna, and what besides—is just the secret of the proprietors. We naturally have suspicions of secret remedies, but they may have their value after all.

Many cases of emphysematous bronchitis are liable to sudden attacks of bronchial spasm, and these fuming remedies are of much service therein.

Fuming remedies for bronchial spasm are quite compatible with remedies administered internally, and directed against the turgescence of the mucous membrane. Such are the measures given above for the treatment of the variety sec.

It becomes a question at times whether the obstruction to the respiration due to diminution of the lumen of the air-tubes, is rather owing to the swollen condition of the bronchial lining membrane, or to bronchial spasm. In cases of doubt, it will be good practice to use the fuming remedies and to administer belladonna internally, as the ammonia mixture with atropia given at p. 119. The spasm is often of gouty character, and then the iodide of potassium mixture (p. 113) will be found of service.

These asthmatic attacks are very exhausting; and when the spasm has relaxed, the necessity for stimulating expectorants is the same as after the mucous membrane is relaxed in the variety sec. The same dietary precisely must be adopted, sustaining yet easily assimilable. Attention to the condition of the right ventricle is not to be omitted from the plan of treatment.

Very similar to the asthmatic complication in its symptoms is the complication of capillary bronchitis, as seen in the case given at pp. 60, 61. The line followed out there is, perhaps, the best that can be devised in such cases. It is neck, or nothing! The inspiratory muscles are wearied by the persistent demand upon them to drag the air through the fine tubes, all but obliterated by the swelling of the mucous membrane, and they must be kept going. Strychnia may be given till the limbs twitch—at least, I mean to push it to this length when the time for it comes; the patient can but die; and the certainty of death from the disease outweighs any questions of timidity, or prudence, as to doubtful or possible results of the strychnia in doses beyond those of our posological tables. Strychnia with ammonia and digitalis every three or four hours, alternating with a teacupful of milk with a dessertspoonful of brandy in it—*coup sur coup*—that is requisite, and nothing less. Without this the respiratory centre, long-suffering and enduring as it is well known to be, will fail; and with it the patient's chance of life. The medical man must stand up to the malady, as a swordsman to his antagonist, without flinching, or taking the eye off for a moment. And, mind, when the heat of the battle is passed, see that the patient do not fall into too profound a slumber; the hemispheres may go to sleep, but not the basal centres in the medulla. If consciousness deepen into coma, the respiratory centre may fall asleep as well as the hemispheres; and then sleep passes into death. When a pedestrian has completed a long match, covering days and nights, or even weeks, with but snatches of rest (or, maybe, breaks down under the test), his trainer does not let him sleep undisturbed till he awakens of himself. He knows there is danger in this; the wearied walker may never awaken if left to himself. So he wakens him up at intervals, gives him a little liquid food; and then permits him to drop off again. Now there is much to be said for this watchfulness, which might be imitated with benefit in cases where sleep follows upon long

effort from an embarrassed respiration ; whether natural or procured by soporific agents. Where a fatal result has followed the administration of an ordinary pharmacopœial dose of opium—an untoward accident by no means unknown—the story is to this effect : the patient slept ' beautifully ' for some time ; then he, or she, could not be wakened ; and then in an hour or two more death took place. Had the attempt to awaken the sleeper been more efficient, probably the fatal result might have been averted.

Deep sleep, then, should not be allowed to pass on uninterruptedly to coma. If the sleep seem to become comatose, the attendant should be directed to move the patient ; and if this be not easily accomplished, to seek the medical man without delay or waste of time. If ordinary measures—as shaking, pinching, loud noises—fail, then it might be well to inject $\frac{1}{10}$th of a grain of strychnia under the skin ; or the same amount of atropia ; and to use the battery. Such measures, promptly adopted, would have saved many a life in the past ; and give promise of often averting a fatal event in the future.

The medical man would wield his narcotic agents in certain emergencies more boldly, if he knew the measures to be adopted when danger looms up ahead. (Not that this statement extends to thoracic disease, be it understood.) Also, when natural sleep following exhaustion threatens to deepen into coma, involving danger to life, a like knowledge would often be of signal service. When a narcotic has been given to a patient worn out by laborious breathing, and danger seems threatening, these measures might save a life, so endangered, if resorted to promptly. The injection might be followed by another, of equal dose, in an hour, if the respiratory centre was found still inclined to slumber.

The catarrhal form of bronchitis does not, as a rule, require relaxant measures, unless some cold produce arrest of the secretion. Here the stimulants to the respiratory centre are

the chief matters ; endowing the patient with the capacity to breathe without too conscious effort, and enabling him to cough effectually.

Beyond these are direct applications to the bronchial mucous membrane, as inhalations. Tincture of benzoin is useful ; and so is carbolic acid, or sulphurous acid when bacteriæ are suspected to be present in the phlegm. Or they may be indicated when the secretion is obviously purulent, of which the best evidence is the yellow colour, or the odour. Or in fœtid bronchitis when cavities or dilatations of the bronchiæ hold large quantities of secretion which become putrescent. Carbolic or sulphuric acid inhaled by means of the spray are useful here. Turpentine or Terebene may be tried as inhalations under these circumstances.

Then there is the internal use of the balsams, the 'balsamic remedies.' Recent writers only repeat what the older authorities have said on these agents. In speaking of balsam of Peru, Pereira points out how 'its supposed efficacy in curing external ulcers and healing wounds has led to its use in internal diseases. It proves serviceable in some old asthmatic cases, chronic pulmonary catarrh, winter coughs, etc. It seems to be principally adapted to *old-standing chronic affections of the mucous membranes* (especially the bronchial mucous membrane), particularly in persons of a cold and torpid habit.' The difficulty with this agent, the balsam of tolu, and turpentine, is that there is no form in which they can be given which is palatable, yet potent enough to be useful. They may be beaten up with yolk of egg, gum, or honey. Turpentine is not very repulsive if the nose be held when it is taken. Syrup of tolu is a very pleasant flavouring agent in any mixture in which such agent is admissible. If the means of the patient will admit of it, a residence where the air is at once warm and dry is a potent measure when the chronically diseased bronchial mucous membrane throws off a large quantity of secretion, and there is much pus in the secretion.

Where such change is impracticable, then these balsams and medicated spray inhalations must be tried; and persevered with in the hope of amendment.

Sometimes the secretion is of the nature of a rheum, indicating astringents, as the glycerine of tannin. Having no experience of this agent personally, I applied to Dr. Sidney Ringer; but his experience is too limited for him to speak positively on the matter.

If this agent be used, it ought to be well diluted, else it might dry up the mucous membrane to an inconvenient extent. Such, too, might be useful in cases where bronchial hæmorrhage is the result of a slough coming away; such sloughs forming at times where dilated or pouched bronchi form reservoirs of acrid secretion. The hæmorrhage comes from the abraded surface left when the slough is torn off by some violent effort of cough. This is, however, not a common accident in chronic bronchitis.

It was said before that in many cases chronic bronchitis was modified very profoundly by accompanying conditions of the lung-structures, as in the cirrhotic and emphysematous forms. It was then pointed out that the cirrhotic form of chronic bronchitis presents an aspect closely resembling that of pulmonary phthisis. Indeed, it may fairly be asserted that in very many cases chronic bronchitis with cirrhosis of the lungs is spoken of as pulmonary phthisis, both by the medical attendant and the patient; as well as the patient's friends. As regards the treatment and general management of such cases, they are identical with those appropriate for cases of pulmonary phthisis, where the new growth may contain tubercle. As such cases are very frequent, and the impressions of the profession on the subject of their management are as yet rather unformed and lacking in completeness, it may be well to treat the subject a little at length; and the better-informed of my readers must pardon me if, in doing this, I somewhat offend their consciousness of knowledge.

The danger of new growths of connective tissue in the lungs, is the tendency of the new growth to break down, carrying with it so much lung-tissue ; and the formation of a cavity, the walls of which are of degraded tissue, which may in turn break down by molecular necrosis. Such break-down may be due to inherent want of vitality of the new growth, as is the case with tubercle proper ; or the neoplasm may be able to keep itself alive so long as the general nutrition keeps up, and it is fairly fed. But the general nutrition may be impaired either by actual want of proper food, more commonly by failure of the digestive and assimilative processes, and partial starvation of the area be consequent thereupon ; or there may be some drain exhausting the system, as diarrhœa or menorrhagia. Apex consolidation may remain perfectly harmless for years, with or without bronchial dilatation, according to the nature of the case ; but the day may come when general mal-nutrition produces such starvation of the affected part that it begins to break down. It has been said elsewhere ('Indigestion and Biliousness') that an individual with such a weak spot is liable to be killed from the breaking down of the affected area when an hour of trial comes. 'It is just the company of soldiers over again ; under a severe demand the weakest break down first. Or in a famine, the healthy members of the family survive, having been hardly tested ; but poor Tom ! whose lungs were bad to start with, he succumbed. A tombstone tells of him. Unfortunately in the body-family one member cannot die out and leave the rest. He must live with them, or they must die with him ! Hence the terrible necessity for seeing that the "poor Tom" of the tissues does not die when the evil day of famine-allowances arrives.' The quotation points out the danger to be apprehended from the presence of a weakened piece of lung-tissue when the nutrition becomes impaired. The less the amount of new connective tissue the better its quality, and the less such danger. But failure of the

nutrition is the evil of which one has to be most apprehensive in the cirrhotic forms of bronchitis; it is the side on which danger threatens.

Consequently then, our first duty is to look to all outgoings, all drains or leaks by which the body-force or the nutritive powers may be 'tapped.' Diarrhœa for instance, in both sexes; menorrhagia and leucorrhœa in women. Always the deadly night-sweats to which such patients are ever liable. Sweat is a secretion containing large proportions of the blood-salts, phosphates, chlorides, and sulphates of the alkalies, among other matters; and when these are drained away the appetite fails, and assimilation is impaired. Stop the night-sweats and in two or three days the appetite returns; and with it, the power of digestion is regained. It is of the utmost importance then to arrest these night-sweats, indeed all outgoings.

For the arrest of night-sweats several measures are indicated. There is the old measure, oxide of zinc and hyoscyamus, useful when other measures disagree with the patient. Or Dover's Powder, often of service. My ordinary measure is atropine, in doses from $\frac{1}{75}$ to $\frac{1}{25}$ grain, every night at bedtime; starting with the smaller dose and going up as the urgency of the case requires. For, as with Epsom salts, some require larger doses than others. Sometimes it is desirable to combine the atropine with morphia when the cough is exhausting (p. 128).

When diarrhœa coexists then the sulphate of copper is excellent in doses from $\frac{1}{4}$ to $\frac{1}{2}$ grain, with a grain of crude opium at bedtime. Sulphate of copper is compatible with acid mixtures in the day, and so is to be preferred to the acetate of lead; it may be added to the day mixture in doses of from $\frac{1}{6}$ to $\frac{1}{4}$ grain. Atropia and sulphate of copper are the two antihydrotics which have gained my confidence by their trustworthiness.

But these measures at bedtime should be accompanied by appropriate day medicines. Strychnia is a potent stimulant

to the respiratory centre, as has been often said before in these pages, and should form part of the mixture taken in the day,

Liq. strychniæ - - - -	℥iv.
Ac. phosph. dil. - - - -	℥xv.
Inf. gent. - - - - -	ʒj.

Ter in die,

forms a capital day-medicine. When the temperature oscillates daily and the temperature chart shows diurnal peaks, then it is well to give this combination

Quinæ sulph. - - - -	gr. ii.
Ac. phosph. dil. - - - -	℥xv.
Tinct. digitalis - - - -	℥x.
Inf. gent. - - - - -	ʒj.

Ter in die,

which will often shave down the peaks in a very satisfactory manner.

Whatever the measures adopted, tonics and bitters to maintain the tone of the stomach must never be omitted; the failure of the assimilative processes ever being borne in mind. The bronchial part of the malady may be an utterly subordinate matter, and the excessive secretion from the affected area be readily expectorated. It is the associated condition which is the grave matter. At times a localised bronchitis may be lighted up around the diseased area and require its appropriate management according to the indications and the symptoms of each case. The squill and hydrobromic acid mixture (p. 122) is often useful in such cases.

In these cases the phthisical features have to be recognised when prominent; at other times the more truly bronchial features attract our attention; but always and ever the importance of maintaining the general nutrition must be kept in mind as the cardinal matter. In this the sufferer from the

cirrhotic form of bronchitis essentially differs from the sufferer from the truly emphysematous form. This is shown by the tolerance of cod-liver oil manifested. The cirrhotic form (frequently denominated 'senile phthisis' when occurring in persons advanced in life) shows a tolerance of cod-liver oil at all ages; which contrasts with what has been my experience at least in the emphysematous form: these latter bear the oil badly. In lung-cirrhosis, in young and old alike, cod-liver oil usually agrees well. Small doses sometimes are borne when larger doses are not tolerated; and the large doses of cod-liver oil, once in vogue, are now less frequently prescribed.

Fat in some form, however, is very essential as required for the building of healthy tissue, or the repair of impaired tissues; and the patient must be got to take it somehow. Butter is often tolerated when other fat is rejected. Milk and cream are forms in which fat is finely emulsionised. Cod-liver oil is the most easily assimilable of all fats; and will soon be procurable in an emulsionised form, which will render it all the more assimilable with those of weak digestion. Fat is digested after leaving the stomach, and therefore can be given with advantage some two hours after a meal; and when so given does not offend the stomach (those who are interested in this matter can find it further dealt with in detail in 'Indigestion and Biliousness'). It is not well to give fat with the other food when the stomach resents its presence.

Great care is requisite in pushing on the dietary in order not to overrun the patient's assimilative powers, or upset the liver. In order to avoid this accident it is well to slightly purge the patient with some laxative, which is also an hepatic stimulant, as the sulphate of soda, podophyllin; or a pill containing a small dose of mercury. The latter may be taken at night, with some sulphate of soda in the morning following, or some mineral water of purgative qualities, about twice a week.

When the assimilative organs are working well, and the tongue is clean, then, and then only, may some iron be pre-

scribed. There are one or two points about the use of iron which are not as generally known as is desirable. The older the patient, the less is iron indicated. Old people, too, rarely do well with large doses of iron. They require small doses only, and best largely diluted with water. Often a chalybeate is better borne by them when combined with an alkali; and then the ammonia citrate of iron goes well with the bicarbonate of potash, well diluted. In ordinary cases in persons not above middle life, Fellowes's Syrup of the Hypophosphites, or Easton's Syrup, are very pleasant effective remedies. At times it is well to give arsenic with the iron, as the liquor arsenic hydrochlor., with the old tincture of the muriate of iron, in preference to the liq. fer. perchlor. now in vogue. Or the arsenic may be combined with the dried sulphate of iron in pills; and this is an excellent form when a laxative has to be combined therewith, as pil. al. et myrrh. One or two such pills may be taken daily after meals with advantage. But if the iron does not agree with the liver, withdraw it at once, and give vegetable tonics, with or without arsenic. And at times iron even in very small doses does disagree with the liver.

Then in some cases where the digestive powers are very feeble, it is well to rub the patient over with oil—vegetable, as almond or olive; or animal, as neat's-foot or cod-liver oil. The latter are better assimilated, but their odour is repulsive.

When the assimilative powers are easily overrun, and only very small quantities of food can be taken without upsetting the digestive organs, the management of the case becomes very difficult; and will tax the skill and resources of the medical man to the utmost. Generally the case is abruptly terminated by the consequences of some indiscretion in diet; especially in this murderous age of cramming, which is scarcely less homicidal than the bloodthirsty reign of the lancet, which preceded it. Some good-natured kindly-disposed friend is sure a more generous dietary would get the patient on faster; the motive is unimpeachable even if the practice is more than

questionable. The plan is tried, and the results are disastrous; while regret is unavailing. It often requires a very firm will to withstand the pressure put on to allow the patient a more liberal dietary; and at times the friends determine to place the patient under other medical supervision in order to get their own way in the matter; as all medical men of experience know well, from Dr. Andrew Clark downwards. The results soon cause the scales to fall from their eyes, and then their sorrow is poignant; but repentance availeth not in such cases.

Then there is the opposite type of case, the emphysematous form, usually found in persons of broad physique; but much more common with individuals of slight physique than is generally supposed. Here the danger is not failure of nutrition; but some outcome of the venous fulness which follows upon the obstruction to the blood-flow in the pulmonic circulation. Dropsy is the typical end of these cases. Flatulence is their bane in life. As in cases of mitral disease the congested mucous membrane of the intestinal canal gives off large quantities of gas (at least so it is believed), as well as the gas which is evolved in the impaired digestive act. It has been pointed out before how in emphysematous conditions the lungs, while thrusting the chest-wall upward, force down the floor of the thorax, viz., the diaphragm. By such means the thoracic space is enlarged. When then flatulence exists the elastic pressure not only resists the descent of the diaphragm, but tends to force it up, thus diminishing the thoracic space, and embarrassing the respiration; while at the same time the elastic pressure on the diaphragm embarrasses the right ventricle. Between the two the patient is very much distressed. Consequently not only is great care in the dietary requisite, but carminatives are largely required. Pills containing some strychnia (to give tone to the circular fibres of the intestine), some carminative as black pepper, or Nepaul pepper, or even cayenne, with or without a little laxative, according to the circumstances of the case, in compound galbanum pill, are

useful as an habitual medicament for such patients : whether they are taking any tonic or expectorant medicine or not. Flatulence, especially when combined with constipation, is the great persisting trouble with patients suffering from chronic bronchitis combined with emphysema.

Then there are attacks of intercurrent asthma, as might be expected from the hypertrophy of the circular fibres of the bronchial tubes commonly found with this condition (p. 85). Then the fuming remedies spoken of at p. 133, are very useful ; giving speedy relief, as a rule. Such sufferers keep their little box of cigarettes by their side constantly, and smoke one when they feel the spasm coming on.

As regards their ordinary medicines, the combinations indicated are the mixture of atropia and ammonia (p. 119), or the expectorant mixture containing ammonia, nux vomica, and squill, given at p. 121, with or without some digitalis, according to the condition of the right ventricle. When there co-exists an atheromatous condition of the arteries, which is by no means rare, then the force of the radial artery is exaggerated ; and forms a source of fallacy as to the amount of arterial tension. The altered arterial wall causes the pulse to feel stronger than it really is, and so is apt to mislead the unwary practitioner as to the needs of the right ventricle. One good guide there is which will often put him on the right track when tending to go astray in this matter, and that is the bulk of urine. If it is found that the bulk of urine is falling, then the indications for digitalis are imperative. Remembering always that there often co-exists much vesical irritability, and the call to empty the bladder is frequent : consequently measure the whole bulk passed in the twenty-four hours, before deciding upon what to do. It is well at the same time to take the specific gravity, and to test for albuminuria. As the bulk of urine rises, the specific gravity falls ; as the bulk falls, the urine becomes more concentrated, and the specific gravity rises. As the case moves on albumen shows

itself fitfully, any improvement clearing it away altogether. Then a little cold, and, still more, some congestion of the base of the lungs, and back comes the albumen; the ready accompaniment of evil. The albumen may at times be but the outcome of some disturbance in the digestive process, some impairment of the finer processes in the liver; but when its fluctuations correspond with venous fulness and rapidity of the respirations, its significance is unmistakable, and its presence very ominous.

When œdema shows itself, first a little puffiness over the instep, worst at nights, and disappearing after a night's rest in the recumbent posture; then creeping upwards, the skin looking white and tense, and pitting on pressure, the finger-tip leaving a distinct dimple behind it; then it behoves the practitioner to bestir himself. The venous fulness is mounting in spite of his measures. It is necessary to whip on the centres of the circulation and the respiration by their appropriate stimuli in increased doses; and beyond that to administer sharp hydrogogue cathartics. Two scruples of compound jalap powder was the old measure; or $\frac{1}{6}$ grain of elaterium. My favourite measure is $\frac{1}{10}$ grain of elaterium with 1 scruple of Pulv. Scammoniæ Co. Or others prefer 2 or 3 grains of gamboge rubbed up with a drachm of bitartrate of potash, and a few grains of black pepper. One of these may be given twice a week. (It gives more relief when the condition is complicated with a mitral lesion, than when not so complicated.) Free catharsis does not depress under these circumstances as it does in other cases, but is followed by a distinct sense of relief; and usually the relief to the venous fulness so given frees the kidneys, and a larger flow of urine follows.

Such catharsis may alternate with hot baths, especially Sir James Simpson's baths (p. 114), which produce free diaphoresis, and so take away from the blood a quantity of water, reducing the hydræmia. Betwixt the two, plus the expectorants, relief

is often afforded; temporary or permanent according to the circumstances of the case. Sometimes the improvement will continue for a considerable period; at other times it is very evanescent, or perhaps does not follow at all, if the case be very far advanced. When the œdema mounts and the bulk of urine falls simultaneously, while the patient is under active treatment, then that patient's days are numbered; and the end is not far distant.

Now a word as to tapping the swollen legs. My experience has been to this effect: When there are evidences of old kidney mischief, the gouty or contracted kidney, then this local measure is often very efficacious. I remember an old farmer in Westmoreland who was dropsical up to the groins, and desperately ill, who was tapped as to the limbs, and who was out on his pony regularly a month afterwards. But where there is no renal complication, and the œdema is due to venous engorgement only, then such procedure is generally useless; and but adds to the patient's discomfort. If no weeping follows the needling the battle is practically over. Southey's tubes save the bed from becoming wet with effused fluids; but doubts exist as to their efficiency. The depression of the liver in all cases complicated with emphysema, is a matter not to be overlooked in the management of such cases. I am not now speaking of the final stages, but of the stages compatible with the patient's getting about. The liver normally occupies a very cosy nook, and is safe from cold or chill on any exposure; but when thrust downwards by the violent contractions of the diaphragm—and how violent these contractions and those of the accessory muscles in the neck are, is evidenced by the deep depression of the skin between the sterno-cleido and the other mastoid muscles on each inspiration—then the liver comes largely in contact with the comparatively thin abdominal parietes, and is apt to be chilled by cold. Not only that, but in its new, more exposed position, its functional activity is impaired, and the patient is

liable to biliary disturbances, or to excessive formation of urates—the outcomes of deranged metabolism of the albuminoid elements of the food. Consequently the dietary must be strictly laid down, as the first step. Then the liver must be kept warm by a flannel belt, or a sealskin waistcoat ordinarily; and a hot poultice applied whenever any chill has been experienced. When either disturbance has taken place, a mercurial pill, with an alkaline saline purgative to follow, is a good measure to adopt; sweeping away the accumulations of bile or urates, and so freeing the liver from encumbrance—just as poking out the ashes permits of a fire burning up. Older readers will agree with this probably more readily than younger readers, who have been brought up to regard such resort to mercury with an abhorrence which resembles a religious objection, in its force and dominancy.

The dietary of the different forms will be given in a later section.

The degenerative form of bronchitis is rather a rheum; that is, a formation of imperfect epithelial cells, otherwise mucous corpuscles, with a certain amount of fluid. Instead of a limited formation of fairly perfect epithelial cells lining the air-tubes, with just enough of secretion to keep the membrane moist, there is a more profuse proliferation, from the connective tissue, of cells which rarely mature. The mucous corpuscles are immature epithelial cells, which are thrown off with a certain accompaniment of fluid. This is then a degenerative process over which we can exercise no direct control. It is a part of the general decadence of the tissues, of a widespread degeneration. Tonics with stimulant expectorants, carminatives with a very strict dietary—perhaps liberal supplies of alcohol in many cases; these combined with every care and general quiet, mental and bodily, are the appropriate measures to be adopted. These organisms decayed through and through possess no longer any resistive force, and yield before any acute trouble; just as the apple

when ripe enough falls before the slightest shake, or the gentlest breeze. With the requisite care, however, they 'put on,' to use a colloquial phrase, very often much longer than would be anticipated by anyone unfamiliar with them. Especially is this the case where the patient is determined to be well taken care of; possesses the requisite means; and has a temper which compels obedience in all around. They are often very trying patients; but the material interests of the medical man will encourage him to pay every attention to their wishes. They may be trying, but they do not fail to remunerate him for the trouble they give. I have heard a medical story of such a case, where the invalid was very wroth with his ordinary attendant because he had not ordered him fur-lined slippers. A very knowing old gentleman was called in in consultation for nothing in particular, but just to soothe the invalid. He noticed the omission, and at once directed attention to it. He did nothing more; but the patient was amply satisfied, and rated his doctor soundly for being so indifferent to him as to permit him to continue leather slippers —to the risk of his life, as he believed.

The mitral form, in all its complications, is all but identical with the emphysematous form, especially as to the *rück-wirkung*, or back-working, from the block in the pulmonic circulation. Indeed, in time, emphysema is implanted upon the primitive condition, from the necessity for forced respiration. There are, however, some matters requiring a little explanation in connection with the mitral lesion.

The first is that commonly a mitral lesion is the result of an acute bronchitis, especially in persons advanced in years. So soon as the significant murmur is detected, the patient should be strictly confined to bed in order to limit the valvulitis, as far as possible. The less the strain thrown upon the mitral valve-curtains at each ventricular contraction, the less will be the cell proliferation in them thrown out. Any movement adds to the strain. Sedatives to allay

the cough may be given here under watchful supervision. Digitalis should be eschewed till the active stage is completely over. A common mistake is to give digitalis, and the general improvement so inaugurated is hailed with satisfaction. But this is a short-sighted procedure. To increase the vigour of the ventricular contractions is undoubtedly to fill the patient's arteries, and so to increase the subjective sense of well-being. The patient feels better for this at the time, and is delighted that he is getting on so well. But watch the case; the satisfaction is but short-lived! The increase in the vigour of the ventricle has thrown more strain on the mitral valve-curtains, and this encourages the cell-proliferation and augments the resultant deformity: be it stenosis by fusion of the valve-curtains together; or insufficiency from contraction and mutilation of them till they become incompetent to close the osteosis. The case moves on all the faster for the digitalis. Consequently it is well to lower the blood-pressure so far as can be safely done; and give the inflamed valves such physiological rest as is compatible with their function. A cautious waiting game has to be played; all the harder to carry out that immediate improvement can so easily be attained, and the temptation is very strong.

In mitral cases, too, an improvement in the circulation is usually followed by such diminution of the bronchial secretion, and relief from cough—the 'heart-cough' of lungs gorged with blood—that the patient would willingly agree to the short-sighted treatment, if urged. When the valvulitis has subsided, and a perfectly static condition of the valves has been secured; then resort to digitalis, to good food, and other measures for the encouragement of compensatory hypertrophy, especially of the right ventricle, are not only permissible but are indicated, and to be pursued.

Remember, then, this broad rule—digitalis may be harmful if exhibited too soon; however useful it may be when the appropriate time comes, and under certain circumstances.

But in progressive valvulitis it is apt to be an edged tool that may cut both ways. When the cell-proliferation is over, and the deformed valve is as quiescent as the scar of a wound, then digitalis will do yeoman-service.

Another matter is this: When there is a mitral lesion there is always some fulness of the pulmonic circulation. At times acute congestion is implanted upon the permanent condition. The large pulmonic capillaries are liable to such changes, indeed. Hæmoptysis may come on, furnishing much relief; but at times apt to be intractable. Venesection might be tried in such a condition: at least I mean to try it when the occasion arrives. Usually the relief furnished by the hæmorrhage leads to its arrest; and extreme quiet is the only valid measure we can practise to encourage such result; astringents being of little value in this form of hæmoptysis. At other times congestion of one or both bases of the lungs follows some exposure; adding to the embarrassment of the already burdened respiration, no little. There may or may not be hæmoptysis consequent thereupon. Sometimes this prevents the spread of the congestion. Now what I am about to say is a matter of personal experience; the experience of others may be somewhat different. I am not, however, so impressed with any possible experience which may have happened to some one else and is unknown to me; as with that which has actually occurred to myself. My experience formulates itself as follows: Congestion of the bases of the lungs is rather a hospital complication, than a matter of private practice. In a hospital, when the patient's powers are taxed, congestion of the bases of the lungs is very common; and it is a cardinal rule to examine the backs of the lungs at frequent intervals. This is not the case with private patients, as a broad rule. With them it is better to count the respirations carefully before disturbing them. If they are not mounting, you may be pretty easy about congestion, hypostatic or other. If they mount in frequency, then examine

the lungs carefully; you will probably find something. It never looks well to examine for something you do not find! The American who advised a friend 'never to guess till he was sure,' was a wise man in his generation. So be pretty certain that there is basal congestion, before you disturb the patient to make absolutely sure of it by physical examination. But at times it is found with private patients; and a very bad indication it is, to my mind. Why is it apt to be found in hospital patients rather than in private practice? Because it is the associate of exhausted powers, in other words 'a broken constitution,' or very severe disease. When, then, it shows itself in a private patient the prognosis is very bad, and the outlook darkly clouded. Being but the outcome of personal experience, these remarks must be taken for what they are worth. Neither more; nor less!

Where attacks of dyspnœa come on in cases where there co-exists either valvular disease or a weakened condition of the heart, then nitro-glycerine seems to be of much promise. Relief it certainly gives; and in a very unpromising case I saw some time ago at Sandown, I.W., with Dr. Green of that town, something more was attained by its use. From an unpublished paper by Dr. Green, I gather he holds it not only to dilate the arterioles (like nitrite of amyl); but to act powerfully upon the heart, increasing the force of the ventricular contractions. There are many complications where an agent possessing such properties is likely to be very useful.

Finally, there remains gouty bronchitis to be dealt with. Here we have a mucous membrane affected by a general condition of the blood and body fluids, viz., the presence in them of uric acid in excess. This may be due to (1) depraved action of the liver, in which uric acid is produced in excess, some perversion of the metabolism of albuminoids in the liver; or (2) deficient excretion by the kidneys, especially in the cirrhotic, contracted, or gouty kidney. Prof. Geo. Johnson holds the kidneys become secondarily affected when per-

sistent large quantities of urates are formed by impaired hepatic action; a view which seems quite sound. Consequently the permanent treatment of gouty conditions is to attend to the liver: to diet the patient properly on albuminoids in sparing quantities, and of a kind which is little likely to undergo perversions of metabolism in the liver; and to place him on a course of hepatic stimulants to restore the functional activity of the organ. (This is too lengthy a matter to enter upon here, and the reader who wishes to pursue this subject will find it dealt with at considerable length in 'Indigestion, Biliousness, and Gout in its Protean Aspects,' of which Part I. is already published.)

As to the second division of the subject, it is comparatively simple. It consists in making uric acid soluble; and this is readily done by giving lithia, or potash, or both combined, to the patient. Urate of lithia and urate of potash are both readily soluble salts, easily finding their way out of the body by the water-emunctories. Sometimes there are evidences of much bronchial irritation as a sort of dry first stage in gouty personages which resist the ordinary measures, but which do well on a mixture of iodide of potassium and bicarbonate of potash in serpentaria, or buchu. The acidity of the expectorated phlegm is often a most useful guide to the correct diagnosis of these cases, which sometimes are very obscure.* A mercurial pill at bedtime, with some sulphate of soda and potassio-tartrate of soda next morning, is often very useful in such cases; especially when there are deep pink lithates. A restricted dietary, warm clothing, and the medicines well

* There are usually the other evidences of a gouty condition, given p. 98, present, which clear up the diagnosis. It is the more necessary to insist upon this, that the case usually goes on, not only not alleviated by the ordinary measures, but even from bad to worse, causing much distress to the patient and anxiety to his friends; because its correct nature has not been diagnosed: and when it does reveal itself in its true colours, the medical man is liable to suffer in reputation from the oversight, as the patient is apt to call it.

diluted with water, are the main indications for the management of these cases.

The management of gouty bronchitis is really that of the gouty individual, *plus* the stimulating expectorants when the secretion is thoroughly established. The subject of lithiasis, or lithæmia, or in other words 'the gouty man,' is an organism bearing its own features; and until these are thoroughly familiar to the trained eye, a certain percentage of errors must be made.

There is one agent, however, which is perhaps specially indicated in the gouty form of chronic bronchitis, and that is benzoin. Benzoic acid is readily found in the urine when given in large quantities. Its relations to hippuric acid are very interesting; but its effects upon the urine are variable. Drs. Ure and Golding Bird have held the view of its utility in the uric acid diathesis. If this is so, then it will of course be useful in gouty bronchitis. It is widely found in the vegetable kingdom, 'constituting the peculiar principle of all true balsams' (H. C. Wood).

So much then for the medicinal treatment of the various forms of chronic bronchitis.

Some general remarks applicable to the regimen and dietary of chronic bronchitis may now be appended thereto. When the cirrhotic form is encountered, then, as said before, the nutrition is the great matter to be attended to. Fat especially, in some form or other, is here desirable to aid in the building of healthy tissue elements. In all cases the food should be at once readily digestible and appetising. The staple of the dietary, properly speaking, should be milk puddings, with stewed fruit. These give little trouble from flatulence in their digestion, and pass kindly through the different stages of the digestive act. Meat, strong food as it is held to be, is readily swallowed, but its digestion and elaboration in the liver is difficult; little is converted into tissue-pabulum (the albumen of the liquor sanguinis), while a large proportion is

diverted to bile salts (the bile acids are both nitrogenised compounds), or urine solids. It is not what can be swallowed, but what can be digested that has to be calculated. Fish, chicken, perhaps rabbit, are the most suitable meats where the digestion is impaired; and that occurs in the bulk of cases of chronic bronchitis. The block in the pulmonic circulation works backwards, and venous engorgement of the viscera, and especially those intimately related with the valveless portal circulation (with its distensible veins), leads to impaired functional activity in them. This fact the medical man must ever keep well before him, and doing so will deliver him from many a mistake he might otherwise make. Milk, fruits, farinaceous matters, fish, white meat, these should constitute their staple food. Fat, as cream or butter, should be eaten up to the limits of the digestive powers. Bronchitic patients, except in the cirrhotic form, as a rule, do not take so kindly to cod-liver oil as do phthisical patients, nor does it agree with them so well, even in small quantities.

When advanced in life, alcohol, however, often suits them in considerable quantities even, when the appetite is very bad. It should not be taken undiluted, nor diluted with aërated waters, as a rule; but with milk, or with sugar and hot water. These last add materially to its food value. In acute exacerbations alcohol sometimes must be pushed freely. In chronic conditions it may be resorted to more sparingly; yet, even then, in larger quantities than are indicated in most other chronic affections.

The clothes should be warm and light. The first because the oxidising processes are impaired, and the body-temperature is low; the second because it is an effort to breathe, and the weight of clothes is oppressive. One good undershirt is equal to one great-coat in warmth, and is infinitely lighter. A stout chest-protector, back and front, covering the chest completely, should be worn in winter. If an overcoat is indicated it is best lined with fur; the lightest and warmest of all

material used for raiment. An eider-down quilt at night should never be forgotten, and is within the means of most. Heavy cotton counterpanes are an abomination to be shunned. Woollen blankets are much to be preferred. A paper bed-cover is at once light, warm, and inexpensive. In sick asylums the wards are warmed, and less attention is requisite to the bedding. In cottages and small farm-houses where sufferers from chronic bronchitis abound, the rooms are cold. There may be a little fire kept burning always, but this entails cost. The walls of the rooms are generally, on two sides at least, exposed to the wintry blast, and so are cold. The patient must be well covered, or 'happed,' to use an old-fashioned term, in order to be comfortable. The measures advocated at p. 108 should be adopted to prevent an ill result from exposure. Woollen underclothing, drawers, and stockings are imperative. The shoes should be stout, and large enough to admit of a thick cork sole without compressing the feet till the circulation of the blood in them is impeded. If damped out of doors, they should be at once exchanged for warm slippers on gaining the house. The long boots in vogue on the Continent, especially among the Magyars, are indicated for those who are still able to get about and attend to their business. So clad they are fairly safe against cold and damp

When the patient is confined to the house, it is well to take to bed in bad weather; indeed for all the winter months and through the rude blasts of March it is best, if the patient can be induced to adopt the plan.

Then as to residence. Where the means will admit of it, the chronic bronchitic should follow the practice of the swallow; going South for winter, returning when the days of later spring permit of it. The south coast, and especially the Undercliff of the Isle of Wight, affords good winter residences. The railway along the Undercliff will be a great advantage when opened, as it will allow of short excursions in the middle of the day. What could be better than to breathe the

balmy air of a sunny spring day from the top of Black Gang Chine; taking in the ozone borne by the ocean breeze, wafted over the warm salt water of the Gulf Stream, ready aired for the sufferer's wants? Or in the brief sunshine of a winter day to venture out under Steep Hill, past the National Hospital for Consumption; the finest site for the purpose within the four seas of Great Britain.

And now a word in favour of a most useful invention, often scorned and scoffed at by the mockers—the unsightly respirator! Yet, if once worn till the comfort it gives is fully realised, never again laid aside; no matter what opprobrium or smarting remarks it provokes. Twelve years' experience of the winter resort to a respirator entitles me to have an opinion on the subject. First worn when much about in the smoky town of Leeds, with the bronchial membrane teased by smuts, by irritants mechanical and chemical: the relief it afforded was such that its use was continued as a prophylactic ever since: till now it is constantly worn in winter—not because I am ill but because I desire not to be ill. It is difficult to overcome the objections of many patients to the use of this ugly article; but once thoroughly tried, it is continued on its merits.

Especially is it desirable to wear it in winter where a southern residence is impracticable. The warm outgoing air leaves much of its heat on the metal plates, which is taken up again by the cold incoming air, whose temperature is raised thereby. This economy of the body-heat is very important to the gelid sufferers who, from impaired respiratory changes, have no heat to spare.

[Dr. Sinclair Coghill has recently advocated a use of the respirator which promises well. It is made of two plates of metal, betwixt which a layer of cotton-wool can be placed; this is medicated from time to time with some deodorizer and disinfectant, as carbolic acid. In cases of offensive odour from pulmonic cavities or bronchial dilatations, this respirator

is most useful: not only does it do away with the stench which offends; but it seems to exert a truly curative influence upon the production thereof.]

Then warm fur-lined gloves should be worn when out-of-doors. The chronic bronchitic is the friend of the fur-trapper of all Arctic regions.

A final word as to 'bathing' when at the seaside. The deficiency of body-heat comes into force again here. The dip should be very short when taken. A sponge-bath of sea-water at home is infinitely safer. Sea-bathing is not a tonic adapted to sufferers from chronic bronchitis. Their impaired oxygenising processes are never to be overlooked or under-estimated.

Little matters tell on their crippled organisms. Their life hangs by a thread. A slight act of forgetfulness, unimportant to others, may snap the frail cord. A trifling intercurrent complication will often gravely endanger life. When this is survived the greatest care is still requisite. Convalescence does not, and cannot, go on in them as in a healthy adolescent coming out of a fever. Slowly, gradually, by steps brief and broken only, they regain their wonted position; normal scarcely applies to them. A shattered existence is theirs. A fact which must never be forgotten by them and those around them. 'A creaking gate hangs long' is a proverb which applies to these invalids; provided that it is always recognised that the gate is a 'creaking gate.'

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THE END.

BAILLIÈRE, TINDALL AND COX, 20, KING WILLIAM STREET, STRAND.